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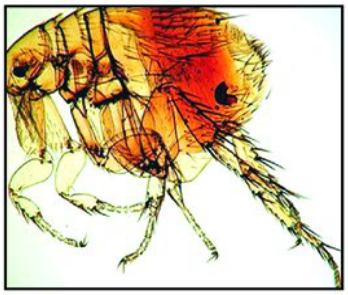

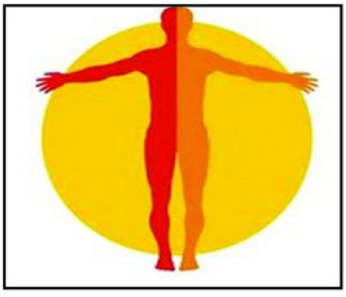

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Preface

Dear Students,

Let me first thank you for your overwhelming support to the Seventh edition of the book, making it the **Best-seller book on the subject in India since last 7 years.** It again reiterates my belief that good content by a subject-specialty author is always appreciated by students. It now gives me immense pleasure to share with you the NEW (Eighth) edition of the book.

Key features of Seventh edition retained in Eighth edition

- **Theory given at start of each chapter** (Theory divided chapter-, topic-, sub-topic wise – Small/one-liner points in each topic/Important previous MCQs marked as^{Q})
- **Key REVISION Points given on side of each topic for MUST-KNOW MCQs facts**
- **New/Recent Examination based pattern has been adopted chapter-wise** (Focus on Wider coverage, Concept development, One-liner approach, Value-based MCQs, Applied aspect MCQs, Image-based MCQs, Updated Golden Points)

In the Eighth edition of the book following NEW ADDITIONS have been done to make a student stay ahead in this competitive era with changing pattern of Examinations:

- **New Live Updated Lecture Epidemiology 3 hours (DVD)**
- **New PICTURE MCQs** with Answers (According to "*Recent Examinations*")
- **Recent most solved MCQs papers**
  - AIIMS May/November 2015, PGI May/November 2015, JIPMER PG 2015, Bihar PG 2015, AP PG 2015, ESI IMO 2014–15, PGMCET 2015, UPSC CMS 2015
  - ALL "*Recent Questions*" 2012–15
- **Recent/New topics and changing concepts in PSM**
  - New National Immunization Schedule 2016
  - Sustainable Development Goals 2015
  - National Health Policy 2015
  - Evidence Based Medicine, Meta-analysis, Systematic reviews
  - H1N1 Categorization, Oseltamivir Dosages
  - RNTCP: Weight bands, New Diagnosis and Treatment Guidelines 2015
  - New DLHS Survey
  - New Initiatives: TB Mission 2020, ALL-IN Initiative, HIV-PEP
  - New Schemes: NIKSHAY, Swajaldhara, Link worker, Ujjwala, ICPS
  - New Health Programmes: NHM, RBSK, NSSK, RKSK, PMJDY, PMSSY, NUHM
  - New strategies: RMNCH+A, STOP/End-TB, NLEP 2012–17
  - New Changes in RTI/STI Treatment 2015 (STD colour kits, Suraksha clinic)
  - New PPTCT Guidelines 2015 (Triple ARV Prophylaxis)
  - New Rabies Prophylaxis Guidelines 2015 (Essen, Thai Red Cross Regimen)
  - New NACP Guidelines (HIV district classification, LAC, LAC PLUS, ART PLUS)
  - Newer/Emerging Diseases (H5N6, H7N9, Ebola, MERS-CoV)
  - New Vaccines (Malaria, Rabies)
  - New Protein Quality Assessment Guidelines 2015 (DIAAS)
  - Changes in Epidemiology of Various Diseases
  - Changes in National Health Programmes (NRHM, MDMP, JSSK, HNBC, ICDS)
  - Twelfth Five-Year Plan 2012–17
  - New Establishments (NITI Aayog, NIRT, NIE, NIDM, NDRF)

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- **An Updated complication of Public Health Statistics and Rural Health Statistics in India 2015**
- **Other New Inclusions/Upcoming Topics:** Triangle of Epidemiology and Advanced Model of Epidemiological Triangle, Ottawa Charter—Health Promotion, NEW DRAFT PROPOSED Biomedical Waste Management Guidelines, 2011/2015, World Health Day 2016, QALY, YPLL, New Sterilisation Guidelines, New Semen Analysis (WHO) Guidelines, Newer Visual Impairment Guidelines, National Abortion Guidelines, DASH diet, Latent TB, Danger Signals of Cancer, Haddon Matrix, BPL Criteria, Glycemic Index, National Deworming Day

'Understanding PSM is difficult, owing to the vastness of the subject, but enjoyable, if you come across a good teacher and a useful book!'
—A student

While preparing for PG entrance examination, I myself realised that most of the PSM MCQs, related text and even the referenced answers given in books were invariably unable to satisfy me as a student. Most of the times, there were questions from '*topics not given in standard textbooks*' (for example, nested case control study, case series report, statistical errors, probability, odds and likelihood ratios, health legislations, water washed diseases, Golden rice, COPRA, Punnett square, Dixon's Q-test, Evidence based Medicine, etc. – all together just the tip of an iceberg of such MCQs). Every year there were '*new unheard questions from unexplored fields*', overlapping choices of MCQs from other fields of medicine accompanied with futile search for '*recent most data of Public Health Statistics*', etc. This all made me realise that PSM is a vast and varied subject to conceptualise and memorise. Elaborate books also confused me regarding the relative importance of each topic in the subject. I also realised that students face maximum difficulty in understanding the concepts of '*Biostatistics*' and in obtaining precise, concise and useful data from '*National Health Programmes of India*'.

Also, PG entrance examinations have a sizeable chunk of direct MCQs from PSM subject (Just 1 subject out of 19 total subjects), ranging from 10% to 14% of total (20–25% in CMS-UPSC). Moreover, PSM helps in solving several allied questions (partly or totally) of Paediatrics, Obstetrics, Pharmacology, Medicine, Microbiology, Ophthalmology, etc.

So, there is no denying the fact that '*PSM is of paramount importance*' to successfully tackle any PG Entrance Examination. Thus, I have written this book keeping a student's, a teacher's and an examiner's perspective in mind.

Each chapter divided into topics and sub-topics, **Theory and MCQs arranged section-wise** for more comprehensive understanding of topics. In Theory, **Important previous years MCQs highlighted** (as^{Q}) and MUST-KNOW facts given separately. Book includes PG Entrance Examination MCQs of **AIIMS (1991–2015)** and **AIPGME (1991–2012 + "Recent MCQs")** with referenced, authenticated, full explanatory answers. Solved explanatory MCQs from **DPG, PGI, JIPMER PG Entrance Examinations (2000–2015)** added to help students grasp subject better. Over 3000 solved MCQs from UPSC CMS & Several **State Medical PG Entrance Examinations** (Rajasthan, MP, Andhra Pradesh, Tamil Nadu, Maharashtra, Bihar, DNB, JIPMER, Kolkata, and Karnataka PGMEE) added for wider coverage. Recent most changes in National Health Programmes with updates in Communicable and Non-communicable diseases provided for competitive edge. **A 'NEW' Live Lecture on Epidemiology** (3-hour DVD) has been included as freebie. Many answers are followed by a section on **'Also Remember'** – A compilation of various important noteworthy points based on previous questions from several fields. **Golden Points (Five sets)** have been included for a quick revision just before the examination. Several **Annexures** (Incubation period and Modes of transmission of diseases, Important days of Public Health, Instruments of importance in public health, Important health legislations and programmes in India, Vectors, NHP 2015 & NPP 2000, Proposed BMW Guidelines, Updated Public Health related statistics of India) have been included towards the start of the book to given the student an edge over others.

Please remember there is no substitute to theory books, but hopefully you will find all relevant theory in this user-friendly book.

Despite every possible effort been undertaken to ensure no technical or typographical errors in the book, such are bound to be present in any book. If you come across another such error or if you have any comment, suggestions, queries or views, you are most welcome to e-mail to me for a prompt response. All contributions will be duly acknowledged. Do share your experiences while reading this book and the subject.

Hope you have a successful career ahead.

Wish you Success, *not just in PSM but in Life!*

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From the Publisher's Desk

We request all the readers to provide us their valuable suggestions/errors (if any) at:

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so as to help us in further improvement of this book in the subsequent edition.

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Contents

SECTION 1 : ANNEXURES

Annexure	1:	Incubation Period of Diseases	3
Annexure	2:	Important Days of Public Health Importance	5
Annexure	3:	Instruments of Importance in Public Health	6
Annexure	4:	Mode(s) of Transmission of Diseases	7
Annexure	5:	Some Important Health Legislations Passed in India	8
Annexure	6:	Some Important Health Programmes of India	9
Annexure	7:	Vectors and Diseases Transmitted	10
Annexure	8:	New Tuberculosis Diagnosis (RNTCP) Guidelines in India (w.e.f. 01 April 2009 onwards)	11
Annexure	9:	National Population Policy (NPP) 2000	12
Annexure	10:	National Health Policy (NHP) 2015	13
Annexure	11:	Sustainable Development Goals (SDGs)	14
Annexure	12:	New Malaria Treatment Guidelines in India (2013 onwards)	15
Annexure	13:	Draft Guidelines: Biomedical Waste Management Guidelines 2011/2015	17
Annexure	14:	Golden Points	18
Annexure	15:	Current Public Health Related Statistics of India	31
Annexure	16:	Honors in Health and Medicine	34
Annexure	17:	High Level Expert Group (HLEG) Report on Universal Health Coverage (UHC)	35

SECTION 2 : TOPIC-WISE THEORY MCQs AND EXPLANATIONS

Chapter	**1:**	**History of Medicine**	**39**
		Theory	39
		Multiple Choice Questions	44
		Explanations	47
Chapter	**2:**	**Concepts of Health and Disease**	**51**
		Theory	51
		Multiple Choice Questions	60
		Explanations	70
Chapter	**3:**	**Epidemiology and Vaccines**	**84**
		Theory	84
		Multiple Choice Questions	118
		Explanations	146
Chapter	**4:**	**Screening of Disease**	**201**
		Theory	201
		Multiple Choice Questions	207
		Explanations	213
Chapter	**5:**	**Communicable and Non-communicable Diseases**	**227**
		Theory	227
		Multiple Choice Questions	290
		Explanations	327

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Chapter 6:	**National Health Programmes, Policies and Legislations in India**	**391**
	Theory	391
	Multiple Choice Questions	429
	Explanations	446
Chapter 7:	**Demography, Family Planning and Contraception**	**481**
	Theory	481
	Multiple Choice Questions	506
	Explanations	518
Chapter 8:	**Preventive Obstetrics, Paediatrics and Geriatrics**	**542**
	Theory	542
	Multiple Choice Questions	559
	Explanations	569
Chapter 9:	**Nutrition and Health**	**590**
	Theory	590
	Multiple Choice Questions	608
	Explanations	624
Chapter 10:	**Social Sciences and Health**	**649**
	Theory	649
	Multiple Choice Questions	657
	Explanations	662
Chapter 11:	**Environment and Health**	**674**
	Theory	674
	Multiple Choice Questions	693
	Explanations	709
Chapter 12:	**Biomedical Waste Management, Disaster Management, Occupational Health, Genetics and Health, Mental Health**	**734**
	Theory	734
	Multiple Choice Questions	748
	Explanations	758
Chapter 13:	**Health Education and Communication**	**776**
	Theory	776
	Multiple Choice Questions	782
	Explanations	785
Chapter 14:	**Health Care in India, Health Planning and Management**	**791**
	Theory	791
	Multiple Choice Questions	800
	Explanations	809
Chapter 15:	**International Health**	**821**
	Theory	821
	Multiple Choice Questions	825
	Explanations	828
Chapter 16:	**Biostatistics**	**835**
	Theory	835
	Multiple Choice Questions	854
	Explanations	871

SECTION 3 : IMAGE-BASED QUESTIONS

Image-based Questions	921

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SECTION 1 Annexures

1. Incubation Period of Diseases
2. Important Days of Public Health Importance
3. Instruments of Importance in Public Health
4. Mode(s) of Transmission of Diseases
5. Some Important Health Legislations Passed in India
6. Some Important Health Programmes of India
7. Vectors and Diseases Transmitted
8. New Tuberculosis Diagnosis (RNTCP) Guidelines in India (w.e.f. 01 April 2009 onwards)
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10. National Health Policy (NHP) 2015
11. Sustainable Development Goals (SDGs)
12. New Malaria Treatment Guidelines in India (2013 onwards)
13. Draft Guidelines: Biomedical Waste Management Guidelines 2011/2015
14. Golden Points (Sets 1–5)
15. Current Public Health Related Statistics of India
16. Honors in Health and Medicine
17. High Level Expert Group (HLEG) Report on Universal Health Coverage (UHC)

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ANNEXURE

1 Incubation Period of Diseases

Disease	Causative organism	Incubation Period (IP)
Chicken pox	Human (alpha) herpes virus 3	14 – 16 days
Measles (Rubeonella)	RNA paramyxovirus	10 – 14 days
Rubella (German Measles)	RNA Togavirus	14 – 21 days
Mumps	RNA Myxovirus	14 – 21 days
Influenza	Orthomyxovirus	18 – 72 hours
Diphtheria	Corynebacterium diphtheriae	2 – 6 days
Pertussis (Whooping cough)	Bordetella pertussis	7 – 14 days
Meningococcal meningitis	Neisseria meningitis	3 – 4 days
SARS	Corona virus	3 – 5 days
Tuberculosis	Mycobacterium tuberculosis	Weeks – years
Poliomyelitis	Poliovirus	7 – 14 days
Hepatitis A	Enterovirus 72 (Picornavirus)	15 – 45 days
Hepatitis B	Hepadna virus	45 – 180 days
Hepatitis C	Hepacivirus	30 – 120 days
Cholera	Vibrio cholerae	1 – 2 days
Typhoid fever	Salmonella typhi	10 – 14 days
Staphylococcal food poisoning	Staphylococcus aureus	1 – 6 hours
Ascariasis	Ascaris lumbricoides	2 months
Ancylostomiasis (Hookworm)	A. duodenale	5 weeks – 9 months
Malaria	Plasmodium vivax	8 – 17 days
	Plasmodium falciparum	9 – 14 days
	Plasmodium malariae	18 – 40 days
	Plasmodium ovale	16 – 18 days
Lymphatic filariasis	Wuchereria bancrofti	8 – 16 months
Rabies	Lyssavirus type 1 (Rhabdovirus)	3 – 8 weeks
Yellow fever	Flavivirus fibricus	2 – 6 days
Japanese encephalitis	Group B arbovirus (Flavivirus)	5 – 15 days
KFD	Arbovirus (Flavivirus)	3 – 8 days
Chikungunya fever	Chikungunyavirus (Arbovirus A)	4 – 7 days
Leptospirosis	Leptospira interrogans	4 – 20 days
Bubonic plague	Yersinia pestis	2 – 7 days
Pneumonic plague	Yersinia pestis	1 – 3 days
Septicemic plague	Yersinia pestis	2 – 7 days

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Scrub typhus	Rickettsia tsutsugamushi	10 – 12 days
Q fever	Coxiella burnetti	2 – 3 weeks
Taeniasis (Tapeworms)	T. solium, T. saginata	8 – 14 weeks
Leishmaniasis (Kala azar)	L. donovani	1 – 4 months
Trachoma	Chlamydia trachomatis	5 – 12 days
Tetanus	Clostridium tetani	6 – 10 days
Yaws	Treponema pertenue	3 – 5 weeks
HIV/ AIDS	HIV/ HTLV – III/ LAV	Months – 10 years
Swine Flu	H_1N_1 Type A Influenza	1–4 days
Crimean Congo Fever	Nairovirus (Bunyavirus)	1–9 days
H_7N_9 Influenza	H_7N_9 Type A Influenza	1–10 days (3.3 days)
MERS	Betacoronavirus	12 days
Ebola disease	Ebolavirus	2-21 days
Anthrax	Bacillus anthracis	1-7 days
Brucellosis	Brucella melitensis	5-60 days

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ANNEXURE

2

Important Days of Public Health Importance

30th January	Anti-Leprosy Day
4th February	World Cancer Day
2nd Wednesday of March	No Smoking Day
8th March	International Women's Day
15th March	World Disabled Day
24th March	Anti-TB Day
7th April	World Health Day
25th April	World Malaria Day
8th May	World Red Cross Day
31st May	No Tobacco Day
5th June	World Environment Day
14th June	World Blood Donor Day
26th June	International Day Against Drug Abuse and Illicit Trafficking
1st July	Doctors Day
11th July	World Population Day
28th July	World Hepatitis Day
8th September	World Literacy Day
28th September	World Rabies Day
1st October	International Day for Older Persons
1st October	National Voluntary Blood Donation Day
2nd Wednesday of October	World Disaster Reduction Day
9th October	World Sight Day
10th October	World Mental Health Day
24th October	UN Day
10th November	Universal Immunization Day
25th November	International Day for Elimination of Violence against Women
1st December	World AIDS Day
3rd December	International Day of Disabled Persons
10th December	Human Rights Day
Last Week of April	World Immunization Week
1–7th May	Anti–Malaria Week
1–30th June	Anti–Malaria Month
1–8th August	World Breast Feeding Week
25th August–8th September	Eye Donation Fortnight
15–21st November	Newborn Care Week

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ANNEXURE

3

Instruments of Importance in Public Health

Instrument	Use
Ice Lined Refrigerator (ILR)	Cold chain temperature maintenance
Dial Thermometer	Cold chain temperature monitoring
Horrock's Apparatus	Chlorine demand estimation in water
Chlorinator, Chloronome	Mixing/regulating the dose of chlorine in water
Chloroscope	Measuring level of residual chlorine in drinking water
Winchester Quart bottle	Assess physical and chemical quality of drinking water
Kata Thermometer	Assess cooling power of air and air velocity (Latter Currently)
Anemometer	Assess air/wind velocity
Hygrometer and Sling Psychrometer	Assess air humidity (moisture content of air)
Assman Psychrometer	Assess air humidity (moisture content of air)
Mercurial Barometer	Atmospheric pressure
Anaeroid Barometer	Atmospheric pressure
Wind Vane	Assess air/wind direction
Salter's scale	Field Instrument for Low Birth Weight (LBW)
Infantometer	Length of infants
Stadiometer	Height of adults
Shakir's Tape	Mid-Arm Circumference (MAC)
Sound Level Meter	Measures intensity of sound
Band Frequency Analyzer	Characteristic of sound (pitch)
Audiometer	Hearing ability assessment

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ANNEXURE

4

Mode(s) of Transmission of Diseases

Disease	Mode(s) of transmission	Remarks
Chicken Pox	Droplet infection, droplet nuclei.	Face to face transmission
Measles	Droplet infection, droplet nuclei, through conjunctiva	4 days before rash to 5 days later
Rubella	Droplet infection, droplet nuclei, vertical	1 week before rash to 1 week later
Mumps	Droplet infection, direct contact	
Influenza	Droplet infection, droplet nuclei	
Diphtheria	Droplet infection, direct contact, fomite borne	95% transmission from carriers
Whooping Cough	Droplet infection, direct contact, fomite	
Meningococcal	Droplet infection	Carriers most important source of infection
TB	Droplet infection, droplet nuclei.	Not Fomite borne
Poliomyelitis	Faeco-oral, droplet infection	
Hepatitis A	Faeco-oral, parenteral, sexual	
Hepatitis B	Perinatal, parenteral, sexual, horizontal	
Hepatitis C	Perinatal, parenteral, sexual	
Hepatitis D	Perinatal, parenteral, sexual	Super-infection/co-infection to HBV
Hepatitis E	Feco-oral	
Cholera	Feco-oral, contaminated foods/drinks, direct contact	
Typhoid	Feco-oral, urine-oral	
Amoebiasis	Feco-oral	
Ascariasis	Feco-oral	
Ancylostomiasis	Direct penetration(skin), oral	Transmission may be perennial
Dracunculiasis	Consumption of water containing cyclops	Water based disease
Dengue	Aedes bite	Water breeding disease
Leptospirosis	Urine, feces, tissues of rats	Direct skin contact
Nipah virus	Consumption of bats-eaten fruits	Person-to-person in India
Ebola virus	Body fluids (blood, semen, urine, feces, vomit, tears, sweat, saliva)	–
Brucellosis	Direct contact, food borne, air borne	Aborted of foetus, placenta can transmit

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ANNEXURE

5

Some Important Health Legislations Passed in India

- The Quarantine Act, 1870
- The Vaccination Act, 1880
- The Epidemic Disease Act, 1897
- The Child Marriage Restraint (SARDA) Act, 1929
- The Employees State Insurance (ESI) Act, 1948
- The Factories Act, 1948
- The Prevention of Food Adulteration (PFA) Act, 1954
- The Hindu Marriage Act, 1955
- The Immoral Traffic (Prevention) Act, 1956
- The Indian Medical Council (Prof. Conduct and Ethics) Act 1956
- The Dowry Prohibition Act, 1961
- The Maternity Benefit Act, 1961
- The Insecticides Act, 1968
- The Registration of Births and Deaths Act, 1969
- The Medical Termination of Pregnancy (MTP) Act, 1971
- The Narcotic Drugs and Psychotropic Substances Act, 1985
- The Consumer Protection Act (COPRA), 1986
- The Environmental Protection Act (EPA), 1986
- The Mental Health Act, 1987
- The Infant Milk Substitutes, Feeding Bottles and Infant Food (Regulation of production, supply and distribution) Act, 1992
- The Protection of Human Rights Act, 1993
- The Pre-conception and Pre-natal Diagnostic Techniques (Prohibition of Sex Selection) [PNDT] Act, 1994
- The Transplantation of Human Organs Act, 1994
- The Persons with Disabilities (Equal opportunities, Protection of Rights, Full Participation) Act, 1995
- The Biomedical Waste (Management and Handling) Rules, 1998
- The Tobacco Control Act, 2003
- The Information Technology Act, 2000
- The Disaster Management Act, 2005
- The National Rural Employment Guarantee Act (NREGA), 2005
- The Protection of Women from Domestic Violence Act, 2005
- The Right to Information (RTI) Act, 2005
- Prohibition of Child Marriage Act, 2006
- The Food Standards and Safety Act, 2006
- The Protection of Children from Sexual Offences (POCSO) Act, 2012
- The Mental Health Care Bill, 2013
- The Sexual Harassment of Women at Work Place (Prevention, Prohibition and Redressal) Act, 2013
- The Juvenile Justice (Care and Protection of Children) Act, 2015

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ANNEXURE

6

Some Important Health Programmes of India

- *National Family Planning Programme:* 1951
- *National Malaria Control Programme (NMCP):* 1953
- *Lymphatic Filariasis Control Programme:* 1955
- *National Leprosy Control Programme:* 1955
- *National Malaria Eradication Programme (NMEP):* 1958
- *National Tuberculosis Programme (NTP):* 1962
- *National Goitre Control Programme (NGCP):* 1962
- *National Trachoma Control Programme:* 1963
- *Urban Malaria Scheme (UMS):* 1971
- *Integrated Child Development Services (ICDS) Scheme:* 1975
- *National Cancer Control Programme:* 1975–76
- *National Programme for Control of Blindness (NPCB):* 1976
- *Kala Azar Control Programme:* 1977
- *Modified Plan of Operation (MPO):* 1977
- *National Mental Health Programme:* 1982
- *National Leprosy Eradication Programme (NLEP):* 1983
- *National Guineaworm Eradication Programme:* 1983–84
- *National AIDS Control Programme (NACP):* 1987
- *Baby Friendly Hospital Initiative (BFHI) :* 1991
- *Revised National Tuberculosis Control Programme (RNTCP):* 1992
- *Child Survival and Safe Motherhood (CSSM) Programme:* 1992
- *National AIDS Control Programme I (NACP I):* 1992–97
- *National Iodine Deficiency Disorders Control Programme (NIDDCP):* 1992
- *Yaws Eradication Programme:* 1996–97
- *Revised Lymphatic Filariasis Control Programme:* 1996–97
- *Enhanced Malaria Control Project (EMCP):* 1997
- *Reproductive and Child Health Programme I:* 1997
- *National Anti Malaria Programme (NAMP):* 1999
- *National Oral Health Project:* 1999
- *National AIDS Control Programme II (NACP II):* 1999–2004
- *National Vector Borne Disease Control Programme (NVBDCP):* 2003–04
- *Integrated Disease Surveillance Project (IDSP):* 2004–09
- *Reproductive and Child Health Programme II:* 2004–09
- *National Rural Health Mission (NRHM):* 2005–12
- *Pradhan Mantri Swasthya Suraksha Yojana (PMSSY), 2006*
- *National AIDS Control Programme III (NACP III):* 2006–11
- *National Tobacco Control Programme (NTCP):* 2007–08
- *National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS):* 2008
- *National Program for Health Care of the Elderly (NPHCE):* 2011
- *National Health Mission (NHM): 2013*
- *National AIDS Control Program IV (NACP IV): 2012-17*
- *Pradhan Mantri Jan Dhan Yojana (PMJDY), 2014*
- *Pradhan Mantri Suraksha Bima Yojana: 2015*
- *Pradhan Mantri Jeevan Jyoti Bima Yojana: 2015*

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ANNEXURE

7

Vectors and Diseases Transmitted

Vector	Disease(s) transmitted
Housefly (Musca domestica)	Diarrhoeal and dysentrical diseases, Poliomyelitis, Yaws, Anthrax, Trachoma
Sandfly (Phlebotamus argentipes)	Kala azar (Visceral Leishmaniasis), Oriental sore (Cutaneous Leishmaniasis), Sandfly fever, Oroya fever
Tse-Tse fly (Glossina palpalis)	Sleeping sickness of Africa (African Trypanosomiasis)
Reduviid bug (Triatominae)	Chagas Disease (Sleeping sickness of America- American Trypanosomiasis)
Black fly (Simulum)	Onchocerciasis (River Blindness)
Soft tick	Relapsing fever, Q fever, KFD (outside India)
Hard tick	Tularemia, Babesiosis, KFD (India), Tick paralysis, Tick encephalitis, Tick hemorrhagic fever, Indian Tick Typhus, RMSF
Louse	Epidemic typhus, Trench fever, Relapsing fever
Mite	Scrub typhus, Rickettsial pox
Flea	Plague, Murine typhus
Anopheles mosquito	Malaria, Filaria (outside India)
Culex mosquito	Bancroftian Filariasis, Japanese Encephalitis, West Nile fever, Viral arthritis
Aedes mosquito	Yellow fever, Dengue, DHF, Chikungunya, Rift Valley fever, Filariasis (Outside India)
Mansonoides mosquito	Malayan (Brugian) filariasis, Chikungunya

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ANNEXURE

8

New Tuberculosis Diagnosis (RNTCP) Guidelines in India (w.e.f. 01 April 2009 onwards)

- Tuberculosis Suspect: Any person with cough 2 weeks or more
- Number of specimen(s) required for diagnosis of smear positive pulmonary tuberculosis: Two
  - Spot sputum specimen (Day 1)
  - Morning sputum specimen (Day 2)
- Diagnosis of Tuberculosis:
  - None sputum positive: Doubtful
  - One sputum positive: Sputum positive pulmonary tuberculosis
  - Two sputum positive: Sputum positive pulmonary tuberculosis
- Management of clients:
  - None sputum positive: Give antibiotics for 10 – 14 days
    - Cough relieved: Non-tuberculosis person
    - Cough persists: Repeat two sputum smear examinations
    1. None sputum positive: X-ray chest
       i. Findings suggestive of TB: Sputum negative tuberculosis; Start ATT
       ii. No findings suggestive of TB: Non-tuberculosis person
    2. One sputum positive: Sputum positive pulmonary tuberculosis; Start ATT
    3. Two sputum positive: Sputum positive pulmonary tuberculosis; Start ATT
  - One sputum positive: Start ATT
  - Two sputum positive: Start ATT

New Revised Guidelines for Treatment of MDR-TB & XDR-TB
(RNTCP 2015-16)

I. MDR-TB Regimen (Category IVQ)

Intensive Phase: 6-9 (K L C Z E Et) + *Continuation Phase*: 18 (L C E Et)

(K Kanamycin; L Levofloxacin; C Cycloserine; Z Pyrazinamide; E Ethambutol; Et Ethionamide)

II. XDR-TB Regimen (Category VQ)

Intensive Phase: 6-12 (H Cm Cz L A M P) + *Continuation Phase*: 18 (H Cz L A M P)

(H High dose Isoniazid; Cm Capreomycin; Cz Clofazimine; L Linezolid; A Amoxy-Clav; M Moxifloxacin; P PAS)

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ANNEXURE

9

National Population Policy (NPP) 2000

Objectives of National Population Policy 2000	–	*Immediate objectives:* To meet unmet need of contraception; to strengthen health infrastructure; to strengthen health personnel and to promote integrated service delivery for basic RCH care
	–	*Mid-term objective:* 'To bring the total fertility rate (TFR) to Replacement Level; i.e. TFR to 2.1'
	–	*Long-term objective:* To stabilize population by 2045
National Socio-demographic Goals of NPP 2000 (achieve by 2010)	–	Address the unmet needs for basic reproductive and child health services, supplies and infrastructure
	–	Make school education up to age 14 free and compulsory, and reduce drop outs at primary and secondary school levels to below 20 percent for both boys and girls
	–	Reduce infant mortality rate to below 30 per 1000 live births
	–	Reduce maternal mortality ratio to below 100 per 100,000 live births
	–	Achieve universal (100%) immunization of children against all vaccine preventable diseases
	–	Promote delayed marriage for girls, not earlier than age 18 and preferably after 20 years of age
	–	Achieve 80 percent institutional deliveries and 100 percent deliveries by trained persons
	–	Achieve universal access to information/counseling, and services for fertility regulation and contraception with a wide basket of choices
	–	Achieve 100 percent registration of births, deaths, marriage and pregnancy
	–	Contain the spread of Acquired Immunodeficiency Syndrome (AIDS), and promote greater integration between the management of reproductive tract infections (RTI) and sexually transmitted infections (STI) and the National AIDS Control Organisation
	–	Prevent and control communicable diseases
	–	Integrate Indian Systems of Medicine (ISM) in the provision of reproductive and child health services, and in reaching out to households
	–	Promote vigorously the small family norm to achieve replacement levels of TFR
	–	Bring about convergence in implementation of related social sector programs so that family welfare becomes a people centred programme

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ANNEXURE

10

National Health Policy (NHP) 2015

National Health Policy 2015 (Draft)

Goal: The attainment of the highest possible level of good health and well-being, through a preventive and promotive health care orientation in all developmental policies, and universal access to good quality health care services without anyone having to face financial hardship as a consequence.

Key Policy Principles

- Equity
- Universality
- Patient Centered & Quality of Care
- Inclusive Partnerships
- Pluralism
- Subsidiarity
- Accountability
- Professionalism, Integrity and Ethics
- Learning and Adaptive System
- Affordability

Key Targets/Priority Areas

- "Health In All" approach[Q] as complement to Health For All.
- 7 Priority Action Areas[Q]: Swachh Bharat Abhiyan, Balanced and Healthy Diets, Nasha Mukti Abhiyan , Yatri Suraksha to ensure road and rail safety, Nirbhaya Nari for action against gender violence, Reduced stress and improved safety in the work place, Reducing indoor and outdoor air pollution
- Swasth Nagrik Abhiyan a social movement for health
- Public health expenditure: ≥ 2.5% of the GDP[Q]
- Population to bed ratio: ≥ 1000 beds per million population (1 per 1000)[Q]
- NUHM to cover all State capitals, District headquarters and Cities/towns with more than 50,000 populations[Q]
- Single digit Neonatal mortality and Stillbirth rates
- Increase the proportion of male sterilization from < 5% where it is currently, to > 30%[Q]
- Leprosy: Reduction to grade 2 disability to < 1 per million by 2020[Q]
- Life support ambulances linked to trauma management centers
  - 1 per 30 lakh population (Urban)
  - 1 per 10 lakh population (Rural)
- A nursing school in every large district/ cluster of districts of about 20-30 lakh population
- A Common Entrance Exam on the pattern of NEET for UG entrance at All India level needs to be enforced. A Licentiate Exam will be introduced for all medical graduates with a regular renewal at periodic intervals with CME credits accrued. All Indian students studying medicine abroad should undertake a screening test to obtain registration with the regulatory body and the same should be applicable for Indian colleges as well to ensure the quality of medical graduates
- A robust National Health Accounts System needs to be operationalized

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ANNEXURE

11 Sustainable Development Goals (SDGs)

Sustainable Development Goals (SDGs)

- 'Transforming our world: 2030 Agenda for Sustainable Development'[Q] - An intergovernmental set of 17 aspiration Goals with 169 targets
- Post 2015 Development Agenda (successor to MDGs[Q])
- Directly Health related goals[Q]: One (Goal 3)
- Directly Health disparities addressing goals: Six (Goals 1-6)

1. End Poverty in all its forms everywhere
2. End Hunger, achieve food security and improved nutrition and promote sustainable agriculture
3. Ensure Healthy lives and promote well-being for all at all ages
4. Ensure inclusive and equitable quality Education and promote lifelong learning opportunities for all
5. Achieve Gender equality and empower all women and girls
6. Ensure availability and sustainable management of Water and Sanitation for all
7. Ensure access to affordable, reliable, sustainable and modern Energy for all
8. Sustained, inclusive & and sustainable Economic growth, full and productive employment and decent work for all
9. Build resilient infrastructure, promote inclusive and sustainable Industrialization and foster innovation
10. Reduce Inequality within and among countries
11. Make cities and Human Settlements inclusive, safe, resilient and sustainable
12. Ensure sustainable Consumption and Production patterns
13. Take urgent action to combat Climate change and its impacts
14. Conserve and sustainably use the Oceans, Seas and Marine resources for sustainable development
15. Protect, restore and promote sustainable use of Terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16. Promote peaceful and inclusive Societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
17. Strengthen the means of implementation and revitalize the Global partnership for sustainable development

GOAL 3: Ensure Healthy lives and promote well-being for all at all ages

TARGETS[Q]

3.1 By 2030, Global MMR < 70 per 100,000 live births[Q]
3.2 By 2030, End Preventable deaths of Newborns and Under-five children
- NNMR 12 per 1,000 live births[Q]
- U5MR 25 per 1,000 live births[Q]

3.3 By 2030, End Epidemics of AIDS, Tuberculosis, Malaria and Neglected tropical diseases and Combat Hepatitis, Water-borne diseases and other CDs
3.4 By 2030, Reduce by 33% Premature mortality from NCDs[Q]
3.5 Strengthen Prevention and Treatment of Substance abuse
3.6 By 2020, 50% reduction in Global deaths and injuries from Road traffic accidents[Q]
3.7 By 2030, Universal access to Sexual and Reproductive health-care services
3.8 Achieve Universal Health Coverage
3.9 By 2030, Reduce Deaths and illnesses from hazardous chemicals, air/water/soil pollution
3.a Implementation of the WHO Framework Convention on Tobacco Control
3.b Research and Development of Vaccines and Medicines for CDs & NCDs
3.c Financing, recruitment, development, training and retention of Health workforce
3.d Strengthen capacity for early warning, risk reduction, management of Health risks

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ANNEXURE 12

New Malaria Treatment Guidelines in India (2013 onwards)

I. VIVAX MALARIA

- Chloroquine X 3 days (10 mg per kg Day 1; 10 mg per kg Day 2; 5 mg per kg Day 3) +
- Primaquine X 14 days (0.25 mg per kg)

II. FALCIPARUM MALARIA

- *In Other States (Other than North-Eastern states)*:
  - Artemisin based Combination therapy (ACT-SP)
    - Artesunate X 3 days (4 mg per kg) +
    - Sulfadoxine X Day 1 (25 mg per kg) +
    - Pyrimethamine X Day 1 (1.25 mg per kg)
  - Primaquine X Day 2 (0.75 mg per kg)
- *In North-Eastern states*:
  - Artemether based Combination therapy (ACT-AL)
    - Artemether X 3 days (80 mg BD) +
    - Lumefantrine X 3 days (480 mg BD)
  - Primaquine X Day 2 (0.75 mg per kg)

PLEASE NOTE:

- *Colour coding of age-wise blister packs for P. falciparum treatment*:

Age	Colour code for blister pack
0-1 year	Pink
1-4 years	Yellow
5-8 years	Green
9-14 years	Red
15+ years	White

- *Treatment of Uncomplicated P. falciparum in Pregnancy*:
  - 1st trimester: Quinine X 7 days (10 mg per kg TDS)
  - 2nd/3rd trimester: ACT-AL in NE states/ACT-SP in Other states

III. MIXED INFECTIONS (P. VIVAX + P. FALCIPARUM)

- *In Other States (Other than North-Eastern states)*:
  - ACT-SP X 3 days
  - Primaquine X 14 days (0.75 mg per kg)
- *In North-Eastern states*:
  - ACT-AL X 3 days
  - Primaquine X 14 days (0.75 mg per kg)

IV. PLASMODIUM MALARIAE

- Treat as P. falciparum

V. PLASMODIUM OVALE

- Treat as P. vivax

VI. MIXED INFECTIONS

- Treat as P. falciparum
- Primaquine X 14 days

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VII. SEVERE & COMPLICATED MALARIA

- *Initial parenteral treatment X 24-48 hours*:
  - Quinine, OR
  - Artemether, OR
  - Artesunate, OR
  - Arteether
- *Oral treatment after 48 hours*:
  - After Parenteral Quinine:
    - Quinine + Doxycycline X 7 days, OR
    - Quinine + Clindamycin X 7 days (Pregnancy & Children <8 years age)
  - After Parenteral Artimisin derivates:
    - In Other states: ACT-SP X 3 days + Primaquine (Day 2)
    - In NE states: ACT-AL X 3 days + Primaquine (Day 2)

VIII. CHEMOPROPHYLAXIS

- Short-term (≤ 6 weeks): Doxycycline OD (Start 1 day before travel; Continue for 4 weeks after return)
- Long-term (> 6 weeks): Mefloquine weekly (Start 2 weeks before travel; Continue for 4 weeks after entering endemic area)

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ANNEXURE

13

Draft Guidelines: Biomedical Waste Management Guidelines 2011/2015

Dear students, PLEASE NOTE: These guidelines are 'draft proposed guidelines' in Gazette of India. They have NOT YET been implemented in India. I shall update its' implementation on my facebook page (www.facebook.com/Dr Vivek Jain) as and when it takes place!

Draft BMW Management Guidelines 2011 are NOT valid for:

- Radioactive waste
- Hazardous chemicals
- Municipal solid waste
- Leas acid batteries
- Hazardous waste

Schedule I: Categories of BMW

BMW category	Type of waste	Disposal steps
Category 1	Human anatomical waste	Incineration
Category 2	Animal waste	Incineration
Category 3	Microbiological and Biotechnology waste	1. Chemical treatment/ Autoclaving/ Microwaving 2. Mutilation/ Shredding 3. Landfill/ Recyclers
Category 4	Wasted sharps	1. Chemical treatment/ Destruction by needle or tip cutters/ Autoclaving/ Microwaving 2. Mutilation/ Shredding 3. Landfill/ Concrete sharps pit
Category 5	Discarded medicines and cytotoxic drugs	Landfill/ Incineration
Category 6	Soiled waste	Incineration
Category 7	Infectious solid waste	1. Chemical treatment/ Autoclaving/Microwaving 2. Mutilation/ Shredding 3. Recyclers
Category 8	Chemical waste	1. Chemical treatment 2. Disposal in drains

Schedule II: Types of Containers and Disposal

Color coding	Waste categories	Treatment options
Yellow	1, 2, 5, 6	Incineration
Red	3, 4, 7	1. Chemical treatment/ Destruction (needle/ tip cutters)/ Autoclaving/ Microwaving 2. Mutilation/ Shredding 3. Landfill/ Recyclers/ Concrete sharps pit
Blue	8	1. Chemical treatment 2. Disposal in drains
Black	Municipal waste	Municipal dump sites

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ANNEXURE

14

Golden Points

PSM: GOLDEN POINTS 1	
Father of Medicine/First True Epidemiologist	Hippocrates
Father of Public Health	Cholera
First Country to Socialise Medicine completely	Russia
Health as a "State of complete physical, social and mental wellbeing" was defined by	WHO
HDI(Human Development Index) comprises	Knowledge (Literacy and Mean years of schooling), Income and Longevity (Life Expectancy at Birth)
Life Expectancy is a	Mortality Indicator (Positive Health Indicator)
"Epidemiological Triad" comprises of	Agent, Host and Environment
Extermination of organism is	Eradication
Action taken prior to onset of disease is	Primary Prevention
Early Diagnosis and Treatment are	Secondary Prevention
Ivory Towers of Disease	Large Hospitals
ICD-10 Classification is for	Diseases
Prevalence is a	Proportion (Total=New + Old Cases)
Total no. of deaths/Total no. of cases is	Case Fatality Rate
Observed Deaths/Expected Deaths is	Standardized Mortality Ratio (SMR)
Prevalence/Duration is	Incidence
Both exposure and outcome have occurred before study starts in	Case Control Study
Cohort Study is	Forward Looking/Prospective Study
Matching	Removes confounding, Ensures Comparability
Relative Risk is	Incidence among Exposed/ Incidence among non-exposed
Framingham Heart Study is a	Cohort Study
Heart of a Control Trial is	Randomization
Occurrence of a Disease Clearly in excess of normal expectancy	Epidemic
Disease imported in a country where it doesn't occur	Exotic
Iatrogenic Disease is	Physician-induced
First case to come to notice of investigator	Index Case
Pseudo-Carriers are	Carriers of avirulent Organisms
Malaria parasite in Mosquito is	Cyclo-propagative Transmission
Gap between Primary case and Secondary Case is	Serial Interval
Yellow Fever/BCG/Measles are	Live Vaccines/ Lyophilised vaccines
First Vaccine to be discovered	Smallpox Vaccine (Edward Jenner)
Risk of Cold Chain failure is greatest at	Sub-centre and Village level
Quarantine is for	Healthy Contacts
Most effective sterilizing agent	Autoclaving (Steam under pressure)
Beaching Powder contains	33% available chlorine

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Advantage gained by screening	Lead Time
Sensitivity identifies	True Positives
Usefulness of a screening test is given by	Sensitivity
Small Pox was declared Eradicated on	8 May, 1980
Rash in Chickenpox is	Pleomorphic and Dew-drop like
Koplik Spots are diagnostic of	Measles (upper 2nd molar)
Incubation Period for Measles is	10-14 days
Strain for Measles Vaccine is	Edmonston Zagreb
Strain for Rubella Vaccine	RA 27/3
Highly Pathogenic Avian Influenza (Bird Flu) is by	Type A (H5N1 strain) virus
Hundred Day Cough is	Pertussis (Whooping Cough)
DOC for Chemoprophylaxis of Meningococcal Meningitis	Rifampicin
Positive Schick Test indicates	Susceptible to Diphtheria
Inability to drink is a sign of	Very Severe Disease
SARS is caused by	Corona Virus
Overall Prevalence of TB infection	30 - 40 %
Sputum Smear +ve at or after 5 months ATT	Failure
Only Bacteriostatic drug in Primary ATT Drugs	Ethambutol
Category II treatment (RNTCP) duration is	8 Months (3m IP + 5m CP)
WHO has recommended 'DANISH 1331' strain for	BCG Vaccine
Failure in RNTCP	Sputum +ve at/after 5 months treatment
Case finding Tool of choice in RNTCP is	Sputum Smear (ZN Staining)
DOTS is	Directly Observed Treatment, Short Course Chemotherapy
Relapse/Defaulter/Failure in RNTCP is classified as	Category II (8 Months treatment)
For every 1 clinical case of Poliomyelitis, there are	1000 subclinical Cases
Polio stool samples are transported in	Reverse Cold Chain (+ 2° to + 8° C)
HBeAg is Marker of	Infectivity/Viral Replication
ORS Solution should be used within	24 Hours
Enteric Fever includes	Typhoid and Para-typhoid Fevers
Chandler's Index for Hookworms is	Av. No. of Eggs/gm of stool
MC arboviral disease is	Dengue
Presumptive Treatment in Malaria	Chloroquine
Only communicable disease of man that is always fatal	Rabies
Main Vector for Yellow Fever is	Aedes aegypti
Pigs in Japanese Encephalitis are	Amplifier Hosts
KFD is transmitted in India by	Haemaphysalis (Hard tick)
Main reservoir of Plague in India	Tatera indica (Wild Rodent)
Scrub typhus is caused by	Rickettsia tsustsugamushi
Sandfly transmits	Leishmaniasis (Kala Azar)
Elimination Level for leprosy	<1/10,000
MDT for PBL is given for	6 months
Yaws is caused by	Treponema pertenue
Slims' Disease is	AIDS
Rule of Halves is seen in	Hypertension

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MC cause of heart disease in 5-30 yr old is	Rheumatic fever
WHO Criteria for diagnosis of RF/RHD are based on	Revised Jones Criteria
MC Cancer in India is	Lung Cancer (Males); Cervico-uterine cancer (Females)
Pap Smear should be done	At beginning of sexual activity and then every 3 yrs
BMI is	Weight (Kgs)/Height^2 (m^2)
Waist Hip Ratio indicates Obesity in Women when	> 0.85
WHO Blindness is	<3/60 in better eye
MCC of Blindness	Cataract
Modified Plan Operation (1977) was based on	API
In Malaria program, MPW does Active Surveillance every	14 days (Fortnightly)
NHP 2002 envisages Kala Azar Elimination by	2010
Elimination Level of Leprosy	<1/10,000
Under RNTCP, Case finding is	Passive
Prevalence of Blindness in India	1.05%
Under RCH Program, Kit A, B are kept at	Subcentre Level
India was certified free of dracunculiasis on	Feb 2001
Annual growth rate for India	1.64%
Sex ratio	No. of females/1000 males (940 in 2011)
Completed family Size represents	TFR (Total Fertility Rate)
2 child norm means	NRR=1
No. of Eligible Couples in India	150–180 ECs/1000 population
Conventional Contraceptives	Condoms/Spermicides
Progestasert (3rd gen IUD) releases	65 mcg/day Progesterone
MC complaint of IUD insertion is	Bleeding
Only Non-steroidal OCP	Centchroman (Saheli)
MTP Act, 1971 was passed in	April 1972
For sterilization, age of Husband should be	< 60 years
Contraceptive Efficacy/failure is measured by	Pearl index (____/HWY)
3 most important MCH problems	Malnutrition, Infection and Unregulated fertility
MC disorder to be screened in neonates	Neonatal Hypothyroidism
Low Birth Weight is	Birth Weight <2.5 Kg
Most sensitive indicator of growth among children	Weight
World's greatest Public Health Tool is	Immunization
Denominator for MMR	Live Births
MCC of MMR is	Hemorrhage
Juvenile is age	< 18 yrs (Boys), <18 yrs (Girls)
Alcohol yields energy of	7 Kcal/gram
Protein requirement	0.83 gm/kg/day
Most important Essential fatty Acid is	Linoleic Acid
Richest Source of Vitamin-A/D is	Halibut Liver oil
First Clinical Sign of Xerophthalmia	Conjunctival Xerosis
Tocopherols are	Vitamin-E
Amino acid converted in body to Niacin	Tryptophan
Richest Source of Vitamin-C	Amla (Indian Gooseberry)

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Adult Pregnant females are Anemic if	Hb < 11 gm%
Optimum Level of Fluorine intake	0.5–0.8 ppm (mg/L)
Soyabean contains	43.2% proteins
Best among food proteins	Egg
An Indian Reference Man weighs	60 kg
Best indicator of Protein Quality	NPU
First Indicator of PEM	Under-Weight for Age
Two-in-One salt contains	Iron+Iodine
Toxin in Lathyrism	BOAA
Phosphatase Test is done for	Efficiency of pasteurization
Acculturation is	Cultural Contact
IQ	Mental Age/Chronological Age × 100
Disinfecting Action of chlorine is due to	Hypochlorous Acid
Residual Level of Chlorine in Water	0.5 mg × Contact period 1 Hr
Temporary Hardness of Water is due to	Ca^{++} and Mg^{++} Bicarbonates
Anemometer measures	Air Velocity
Most satisfactory method of Refuse disposal	Sanitary Landfill/Controlled Tipping
Water Seal in Sanitary latrine is	2 cm
Best approach for arthropod control	Environmental Control
Tiger Mosquito	Aedes
Paris green is a	Stomach Poison
Pyrethrum is a	Space Spray
Yellow bag is used for disposal of BMW	Cat. 1,2,3 and 6 (Cat. 1, 2, 5, 6 in New Guidlines)
Plumbism is	Lead poisoning
MC Occupational Cancer	Skin Cancer
Preplacement Examination is a part of	Ergonomics
Indian Factories Act, 1948 recommends per capita space	Min.500 cu.ft.
Sickness Benefit under ESI Act,1948	91 days
Census takes place every	10 years
1,3,6,7,8, 9,11 Median is	7
Normal Distribution Curve is	Bell Shaped Symmetric
To test significance of Difference between two proportions	Chi-Square test
Focus group Discussion should have	6-12 members
NHP 2002 says, Eliminate Lymphatic Filariasis by	2015
Bhore committee was established in	1943
MPW was given by	Kartar Singh Committee
1 PHC is for a population of	30,000
International Conference at Alma-Ata (1978) gave concept of	Primary Health Care
MDGs have to be achieved by	2015
MPW is located at	Subcentre level
Greatest risk of Cold Chain failure is at	Subcentre and village level
World Health Day	7 April
'O' in GOBI Campaign (UNICEF) stands for	Oral Rehydration therapy
Diseases under International Health Regulations	Cholera, Plague and Yellow fever (and Smallpox, Wild Polio, Human Influenza and SARS)

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PSM: GOLDEN POINTS 2	
Father of Medicine/ First True Epidemiologist	Hippocrates
Search for cases in epidemic is done till	Twice the Incubation period since last case
Point source epidemic	Sharp rise/fall, all cases in 1 Incubation period
Disease imported to a country for first time	Exotic Disease
Phase I clinical trial of drugs done on	Healthy volunteers
MMR is a	Ratio
Case fatality rate	Killing power of a disease
Marc Koska developed	Disposable K1-syringe (auto-disabled)
Measles vaccine stored at	+ 2° to + 8° C
Rubella is	Live vaccine and C/I in pregnancy
Period of infectivity of measles	4 days before to 5 days after rash appearance
Yellow fever Vaccine (17 D)	Live Vaccine
Lyophilized (freeze dried) Vaccines	BCG, Yellow Fever, Measles, MMR
Cold Chain Temperature	+ 2° to + 8° C
Sensitivity	True positives (and Specificity: True Negatives)
PPV is directly proportional to	Prevalence
Dysphagia, dysarthria and diplopia seen in	Clostridium botulinum food poisoning
Leishmaniasis (Kala Azar) is transmitted by	Sand Fly (Phlebotamus)
DOC for Kala Azar (Black sickness) in Indian program	Sodium Stibo-gluconate (Antimonials)
DOC for Lympho granuloma venerum	Doxycycline
Malaria exhibits	Cyclo-propogative transmission
Vector of urban malaria	Anopheles stephensi
Vector of KFD in India	Hemophysalis (Hard Tick)
Japanese Encephalitis, Pigs are	Amplifier Hosts
Tourniquet test (dengue) is +ve	>20 petechial spots/ sq. inch in cubital fossa
Reservoir in Chikungunya fever	Primates (monkeys)
Reservoir of Polio	Man (only)
HEV transmission	Feco-oral route
Hydatid disease cysts in	Postero-superior lobe of liver
Typhoid diagnosed in 1st week by	Blood Culture
Yersinia pseudotuberculosis resembles	Typhoid/Appendicitis (in humans)
8th Day Disease	Tetanus neonatorum
DOC Cholera (Pregnancy)	Furazolidone
Diagnosis in RNTCP	2 sputum smear examination (ZN Staining)
RNTCP Objectives	>85% cure rate and >70% case detection rate
Treatment duration of MBL	12 months (Surveillance 5 years)
Elimination Level of Neonatal tetanus	<0.1 per 1,000 Live births
IP of yellow fever	2–6 days
Validity of YF vaccination Certificate	10 days - 10 years
HIV MTCT	30 %
HIV MTCT due to breast feeding	12-16 %
HIV MTCT Prevention with Nevirapine	50%
Nevirapine in MTCT given to child	Within 72 hours
Zidovudine is C/I with antiretroviral drug	Stavudine

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Best marker of HIV progression	CD4 : CD8 ratio
MC Opportunistic Infection in HIV	Pneumocystis carinii Pneumonia (TB–India)
Blood screening before transfusion	HIV/ HBV/ HCV/ Malaria/ Syphilis
Epidemic typhus main mammalian reservoir	Human beings
Soft Tick is vector of	Q fever, Relapsing Fever, KFD (not India)
Avian Influenza DOC	Oseltamivir 150 mg BD × 5 days
Last outbreak of Plague	Dangud, Uttrakashi (2004)
Indicator of operational efficiency in Malaria	ABER (Annual Blood Examination Rate)
Body Mass Index (BMI)	Weight (kg)/ Height (metre^2)
Highest Growth Rate in India (Census 2001)	Nagaland (64%: 1991-2001) (D & N Haveli in 2001-11)
India is in Demographic cycle	Stage 3 (Declining BR and declining DR)
Highest Life Expectancy	Japan (M: 79y; F: 86y)
Life expectancy India	M: 64 years and F: 67 years
NPP 2000, Bring 'TFR to replacement level' by	2010
% Geriatric population in India	8.1%
Infant Mortality rate	No. of infant deaths per 1000 Live births
IMR of Japan	3 per 1000 LB (MMR: 7 per 1,00,000 LB)
Normal respiratory rate in a newborn	40–60 breaths per minute
Pearl Index (Failure rate per HWY)	Contraceptive Efficacy
Failure rate of condoms	2–14 per HWY
WHO Oligospermia	Sperm Count <20 million/HPF
World Health Day	07 April
National Maternity Benefit Scheme	500/- per birth to poor women (first 2 births)
Short stature in High Risk Pregnancy	< 140 cms
Mental retardation if	IQ Level < 70
Golden Rice is rich in	ß-carotene (and Iron)
Milk is poor in	Vitamin C and Iron
Pulse with highest protein content	Soyabean (43%)
Reference protein	Egg (NPU 96)
Toxin in Lathyrism	BOAA
Pellagra	Niacin deficiency
No plant source for vitamins	B12 and D
Tests of pasteurization	Phosphatase test (MC), Coliform Count, Std plate count
Horrocks Apparatus (Starch Iodide indicator)	Chlorine demand estimation
Level of residual level of chlorine in water	0.5 ppm (mg/litre) for contact period 1hr
Maximum tolerable level of nitrates in water	50 mg/litre
Anopheles larvae rest	Parallel to under surface water
Aedes larvae breed in	Artificial collection of water
Kata thermometer measures	Cooling power of air
Maximum allowable sweat rate	4.5 litres per 4 hours
Vit-D resistant rickets inheritance	Sex-linked dominant
Burtonian Line (Blue Line on Gums)	Lead poisoning (Plumbism)
Group addressed and lecture on specific topic	Symposium
The Factory Act and ESI Act were passed in	1948
Recommended per capita space in Factory Act	500 Cubic feet

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No. of PHCs in India	24, 049
Bhore committee (1946) recommended	'3 Million Plan' and 'Social Physicians'
'Multi-purpose Workers' introduced by	Kartar Singh Committee
'Inventory' (of materials) means	Stock on hand at anytime
Scatter/Dot Diagram represents	Correlation
Histogram is	Continuous quantitative data presentation
Mean (μ) + 2 SD (s)	95 % of total values
Use of Cluster Random Sampling	Evaluation of Immunization Coverage
Chi-square Test	Sig. of association b/w 2 qualitative characteristics

Golden Points

PSM: GOLDEN POINTS 3		
•	Total osmolarity of WHO Reduced Osmolarity ORS	245 mmol/L
•	Routine surveillance is supplemented by	Sentinel surveillance
•	Traditional lifestyles for CHD prevention.	Primordial level
•	Softening of water is recommended above hardness	>150 mg/litre
•	Degrees of freedom for 3X6 table (Chi-square) is	10
•	Word 'Random' means	Equal and known chance
•	DOTS Plus refers to	MDR TB treatment (Cat IV)
•	Low birth weight incidence in India is	28%
•	One Urban-PHC is for population	50,000
•	A group of health experts discuss a health topic & audience	Panel discussion
•	Ambulatory patients in triage	Cat III (GREEN)
•	Mite transmits rickettsial diseases	Scrub typhus, R. pox
•	Drug of choice for scabies	5% Permethrin
•	Statistical test to compare means between 2 groups	Unpaired students t-test
•	Exposure period required for Anthracosis	12 years
•	1 PHC in tribal area for a population of	20,000
•	Dose of ORS for a child with weight 12 kg	900 ml
•	ICD-10 classification is revised every	10 years
•	Main disinfection in chlorination of water is by	Hypochlorous acid
•	3 divisions of Planning Commission	General secretariat, Technical divisions, Program advisors
•	ROME scheme recommended by	Srivastava committee
•	Q-fever is caused by	Coxiella burnetti
•	Q-fever is transmitted by	Inhalation of infected dust
•	Midday meal programme provides	1/3 calories and 1/2 proteins
•	Unmet need for Family planning in India is highest for	Adolescents
•	Number of holes per sq. inch in mosquito net	150
•	MCC of neonatal mortality in India	LBW and prematurity
•	MC side effect of Depot contraceptives	Irregular menstrual bleeding
•	Mortality is included in	NRR (Net reproduction rate)
•	MDG Goal 4 is to Reduce child mortality by	Two-thirds by 2015
•	Health worker in Malaria control must visit all houses every	Fortnight
•	Carcinoma protected by OCPs	Ovarian carcinoma

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•	1 Community Development Block population	100,000
•	Exclusive breast feeding till	6 months age
•	Older name of Janani Suraksha Yojana	National Maternity Benefit Scheme
•	Order in Nalgonda technique for defluoridation	Lime + Alum
•	Numerator of Pearl Index	No. of accidental gestations
•	Richest source of Vitamin D	Halibut liver oil
•	Average incubation period for HIV	10 years
•	Incubation period for Measles	10 days
•	First outbreak of Hepatitis E in Delhi	1955
•	MC food poisoning	Staphylococcus
•	True positive indicate	Sensitivity
•	Best method to prevent Nosocomial infection	Hand washing
•	Hardy Weinberg law failure in	Mutations, Linkage disequilibrium
•	Hepatitis B vaccine is a type of	Killed vaccine
•	Prophylactic treatment of Rheumatic heart disease	Benzathaine penicillin
•	Vector of Yellow fever	Aedes aegypti
•	1994 epidemic in India was.	Plague
•	DOC for Crimean Congo Fever	Ribavirin
•	Effectiveness of MCH services is given by	IMR
•	Kit B is kept at.	Subcentres
•	Richest source of Iron among nuts.	Pistachio
•	Vaccine strain for Swine flu vaccine in India	A7/California/2009
•	Web of causation proposed by	McMohan and Pugh
•	Father of Modern Toxicology	Mathieu Orfila
•	Condom failure occurs due to	Incorrect use
•	BMI of Normal Asian Men	18.5-22.99
•	Infective stage of Plasmodium to man	Sporozoite
•	Spot map was used for study of	Cholera
•	Normal IQ is	90–109
•	Koplik spots are seen in	Measles
•	Acrodermatitis enteropathica is due to deficiency of	Zinc
•	HIV mainly affects cell type	Helper T-cells (CD4)
•	ESI Act cam ein year	1948
•	Amplifier host of Japanese encepahlitis	Pigs
•	Sodium ion content in ORS	75 mmol/ L
•	Hydatid cyst is seen MC in	Liver
•	Main aim of Vision 2020	Eliminate avoidable blindness
•	Shelf life of CuT 380 A	10 years
•	Recommended frequency of school health examination	Once every 6 months
•	Human DNA consist of	3 billion base pairs
•	Doors + windows area in a school class	> 25% of floor area
•	Normal IQ level	90–109 IQ points
•	Highest case fatality rate	Rabies
•	Advice to couple with both HIV+	Use condoms

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•	In ORS, Na^+ absorption is due to	Glucose
•	Ideal contraceptive for newly married couple	Combined OCPs
•	Legal cutoff age for employment in India	14 years
•	Pellagra occurs due to	Vitamin B3 deficiency
•	Father of Modern Anatomy	Andreas Vesalius
•	Bias due to different hospital admission rates	Berkesonian bias
•	Random in Random sampling means	Equal and known chance
•	Diagnosis of Severe Pneumonia in PHC is based on	Chest indrawing
•	Longest path in Network analysis (PERT)	Critical path
•	GATHER approach is used in	Contraceptive counseling
•	Denominator of incidence	1000 total population at risk
•	Measure of killing power of a disease	Case fatality rate
•	IQ formula	Mental age/ Chronological age X 100
•	Marc Koska discovered	K1 auto-disable syringes
•	Combined OCPs increase risk of carcinoma of	Breasts
•	Juvenile definition in Juvenile Justice Act 1986	Boy < 16, Girl < 18 years
•	Plasmodium discovered by	Laveran
•	Life cycle of Plasmodium	Ronald Ross
•	Human genome has	22,000 – 23,000 genes
•	Disability limitation is a type of	Tertiary level of prevention
•	Father of Obstetric Ultrasound	Ian Donald
•	Hardy Weinberg law is associated with	Population genetics
•	Pyridoxine is	Vitamin B6
•	Vaccine given at 9 months age is	Measles vaccine
•	Sufficiency of Pasteurisation is tested by	Phosphatase test
•	MDR TB is	Resistance to INH and Rifampicin
•	Quarantine period for Yellow fever	6 days
•	Ocular disease not seen in India	Onchocerciasis
•	Most frequently occurring value in a data distribution	Mode
•	Strength of association in Case control study	Odds ratio
•	1 female health worker is for total population	5000
•	Census Stop of India	1st March 2011
•	Phase I clinical trial	Health volunteers
•	MC cancer of females in India	Cervico-uterine cancer
•	Growth rate proportional to functions' current value	Exponential growth
•	Sex ratio of India (Census 2011)	940
•	Denominator of GFR	Women in reproductive age group (15–49 years)
•	Most abundant Ig in breast milk	IgA
•	Most important step after disaster	Chlorination of water
•	Area around airports kept free of Aedes	400 m
•	Human anatomical waste goes in Bag	Yellow
•	Category 9 biomedical waste is	Incineration ash
•	Burtonian Line is seen in	Lead poisoning
•	Rural Health Scheme was recommended by	Srivastava Committee
•	MCC cancer death among males in India	Lung cancer

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•	MC type of Vibrio cholerae in India	Hybrid form
•	Wasted sharps biomedical waste category	Four
•	SSPE is seen in	Measles
•	Weight of a newborn triples in	1 year
•	TT doses for a primigravida	2 doses
•	OPV vaccine doses in immunization programme	5
•	In Polio sensory loss	Absent
•	Father of Modern Microbiology	Louis Pasteur
•	Least priority color in triage	Black
•	In DOTS, diagnosis based on.	Sputum smears
•	Maximujm tolerable sound level to human ears.	85 dB

GOLDEN POINTS 4	
India is passing through stage of Demographic cycle	III (Late expanding) stage
Normal level of IQ is	90–109 IQ points
Recommended air changes/ hour in a living room	2–3
First priority in Stroke Control Program	Control hypertension
Isolation in Tuberculosis	Not beneficial
Hospice is for	Old & terminally ill patients
Standard deviation is a measure of	Dispersion
Most virulent Plasmodium species	Plasmodium falciparum
IP of Influenza is	18–72 hours
Stage of Plasmodium responsible for relapses	Merozoites
Pneumoconioses causing Mesothelioma	Asbestosis
Maize-eaters are prone to	Pellagra
Intestinal perforation in typhoid occurs in	Early III week
Extremely low birth weight is	<1000 grams
Congenital rubella syndrome triad is	Cataract, Deafness, PDA
Minimum number of Beds at CHC	30 beds
A subcentre in backward area is for	3000 population
Best dengue diagnosis in first week	NS1 antigen
Population covered by PHC in tribal areas	20,000
Mosquito transmitting Dengue hemorrhagic fever	Aedes aegypti
Low vision is	<6/18 in better eye
Colour coding for dead persons in triage	Black colour
Functional unit of implementation in NMHP	District
Intradermal schedule for Rabies vaccine	8-0-4-0-1-1 (Thai Cross Regimen 2-2-2-0-2)
Breateau index is used for	Aedes aegypti
Highest content of Vitamin D is in	Vitamin D
In a Normal distribution, central tendency	Mean = Median = Mode
Amount of cereals in Mid-day meal program	100 grams
Community development bock equals	100 Villages (100,000 population)
Cyclopropagative transmission is shown by	Plasmodium (malaria)
Virus used to prepare Rabies vaccine	Fixed virus
Babesiosis is transmitted via	Ticks

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Q-fever is caused by	Coxiella burnetti
Exclusive breast feeding is recommended upto	6 months age
Cause of Fulminant hepatitis in pregnancy	Hepatitis E
Couple with wife 15-49 years is	Eligible couple
To achieve NRR = 1, CPR must be raised above	60%
Uppermost curve in ICDS growth chart is	50th percentile for boys
Learned behaviour which is socially acquired	Culture
Watching with attention, authority, suspicion is	Surveillance
Ability to identify true negatives in screening	Specificity
Amino acid deficient in wheat	Lysine
Highest content of saturated fatty acids is in	Coconut oil
Cholesterol with high-risk of CHD	LDL cholesterol
Minimum duration of PEP for HIV	4 weeks
Food poisoning in less than 6 hours of food	Staphylococcal FP
Health promotion is prevention level	Primary level
First referral level is	Secondary level of care
Lepromin test is strongly positive in	Tuberculoid leprosy
Vector of Scrub typhus	Trombiculid mite
MC carcinoma in World	Lung cancer
Clostridium perfirengens cause pollution	Water pollution
Milk reduces absorption of	Iron
DDT mechanism of action	Contact poison
Most essential fatty acid is	Linoleic acid
Single drug treatment of trachoma	Azithromycin
Phase IV clinical trial is done	After marketing drug
Chandler's index is	Hookworm eggs/ gm stool
A child draws triangle by age	5 years
Acrodermatitis enteropathica is due to	Zinc deficiency
Methionine is limiting amino acid is	Pulses
BFHI was launched in	1991
IQ level in Severe mental retardation	21–34
Best treatment for diarrhoea	ORS
Leptospirosis is transmitted by	Infected rat's urine
Validity of YF vaccine	10 days – 10 years
Sharp waste is disposed in	White bag
Duffy negative antigen gives protection against	Plasmodium vivax
DOC for Filariasis	DEC
ASHA is located at	Village level
Female MPW is for	5000 population
CSSM Program was started in	1992
Toxoids are prepared from	Exotoxins
In Indian laws, Child age is	0–18 years
PQLI lies between	0–100
Strain of Varicella vaccine	OKA strain

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GOLDEN POINTS 5	
Prevalence of suicides in India	10.6 per 1 Lac population
MDG related to water supply	20 litres/ day < 1km radius
Number of vaccine vials in Day carrier box	6–8 vials
Number of vaccine vials in Vaccine carrier	16–20 vials
Gender developmental index is	Corrected development index as per gender inequalities
Darwinism fails to explain	Presence of vestigial organs
Cooling curve of body follows	Sigmoid shape
Drug resistance in retreatment of TB	13–17%
Fluorosis is not seen in	Free flowing surface waters
Number of scabies mites per person body	10–15
Biosafety cabinets are disinfected by	40% Formaldehyde
Jai Vigyan Mission is for control of	Rheumatic fever/RHD
Ujjwala scheme is related to	Child trafficking
Preterm birth takes place before	37 weeks POG
Denominator of Stillbirth rate	Live births + Still births (>1000 gm)
Halts disease in incipient stage & prevent complications	Secondary level of prevention
RDA of proteins for adult Indian male	0.83 gm/kg/ day
MC blood group in Indian population	Blood group 'O'
Chandler's Index major public health problem if	More than 300
Chandler's Index is	No. of hookworm eggs per gram stool
ICDS covered under Ministry	Women and Child Development
Anganwadi worker covered under Ministry	Women and Child Development
Integrated Child protection Scheme covered under Ministry	Women and Child Development
Integrated Child Development Services (ICDS) launched in	1975
National Rural Health Mission (ICDS) launched in	2005
National Mental Health Program (NMHP) launched in	1982
National Mental Health Act passed in year	1987
Baby Friendly Hospital Initiative (BFHI) launched in	1991
Child Survival Safe Motherhood (CSSM) launched in	1992
First Disability Census in India	1881
State with highest Solar radiation received	Rajasthan
Not a bridging population in HIV transmission	Male homosexuals
The Great Demographic Divide in India	1921
First Distinguished Epidemiologist	Syndenham
Louis Pasteur (1822-1895) died in	France
Edward Jenner died in	1823
White death is	Tuberculosis
White plague is	Tuberculosis
White leprosy is	Leishmaniasis
Halibut liver oil rich in	Vitamin A, D
Combined OCPs contain	Ethinyl estradiol + Norgestrel

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Tolerable sound level for Factory workers	90 decibels
Severe mental retardation is IQ	21–34 IQ points
Single drug treatment for Trachoma control	Azithromycin
A child is able to draw triangle by the age of	5 years
Best time to do Breast Self-examination screening	One week after menstruation
One ASHA worker is for	1000 population
One Female Health Worker is for	5000 population
MC Indirect cause of Maternal mortality	Anemia
Total population covered by CHC is	80,000 -120,000
Pre-exposure i/m schedule of Rabies vaccine	Day 0, 7, 28
Post-exposure i/d schedule of rabies vaccine	8-0-4-0-1-1
Xerophthalmia is public health problem if	Bitot spots >0.5%
Activation of Yellow fever vaccine after	10 days
Degrees of freedom in Chi-square test	(c-1) (r-1)
Psychotherapy is level of prevention	Secondary
Tracking of BP (Hypertension)	Hypotensive remain hypotensive
Pink colour in IMNCI	Immediate referral
Green colour in IMNCI	Home based management
Father of Public health	Cholera
Child age under ICDS covered	Upto 6 years age
Iodine dose in pregnancy	250 mcg per day
Mild degree of malnutirition is	3.0–3.5 gm/dl
First priority in Stroke control program	Control arterial hypertension
Relapse in Malaria is due to	Merozoites
World poluation affected with trachoma	500 million
Functional unit if Implementation of NMHP	District
1 Community development block comprise	100 villages (100,000 population)
1955 Hepatitis outbreak in Delhi	Hepatitis E
ICD-10 is a	Multiaxial system
Global burden of child mortality	6.6 millions
Settle plate culture method is used for	Air quality in hospital wards/OTs
District border cluster strategy is supported by	UNICEF
Eye donation fortnight	25th August – 6th September
'Anonymous group' is a support group for	Alcoholics

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ANNEXURE

15

Current Public Health Related Statistics of India*

I. SOCIOECONOMIC INDICATORS

- HDI: (2015)
  - Rank 1: Norway 0.944 – High Development
  - Rank 130: India 0.609 – Medium Development
  - Rank 188: Niger 0.348 – Low Development
- *Multidimensional Poverty Index (MPI)*: 0.283
  - Incidence of poverty: 53.8%
  - Population living below poverty line (BPL): 22% (Tendulkar Committee), 29.5%. (Rangarajan Committee)
  - India has 1/3 of total poor in the world
- *HPI*: 31.6% (Rank 58)
- *GDP per capita*: $ 1500
- *Income per capita*: ₹ 87,748/- per annum
- *Population with improved source of drinking water*:
  - Urban: 95.3%
  - Rural: 88.5%
- *Population with improved sanitation facilities*:
  - Urban: 91.2%
  - Rural: 40.6%

II. DEMOGRAPHY & FERTILITY INDICATORS

- *Crude birth rate (CBR)*: 21.4 per 1000 mid year population
- *Crude death rate (CDR)*: 7.0 per 1000 mid year population
- *School participation (primary level)*:
  - Male: 85%
  - Female: 81%
- *Median age at first marriage*:
  - Females: 17.2 years
  - Males: 23.4 years
- *TFR*: 2.3
  - Rural: 2.6
  - Urban: 1.8 (Replacement level achieved in urban areas)
- *Median interval between births in India*: 31 months
- *Contraceptive Prevalence Rate*: 44.6% (Effective CPR 40.4%)
  - Sterilization: 27% (Most common)
  - IUDs: 6%
  - Unmet need for Contraception: 12%
- *Primary Immunization Coverage*: 49%

III. MCH INDICATORS

- *IMR*: (SRS 2014)
  - India: 40 per 1000 Live Births (54 in MP/Assam; 9 in Goa)

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- *MMR*: (2014)
  - India: 167/Lac LB (SRS 2012) [Assam: 300; Kerala: 61)
- *U5MR*: (2014)
  - India: 52/1000 LB
  - UK/USA/Japan/Singapore: <10
  - World: 43
- *NNMR*: (WHO 2012)
  - India: 29/ 1000 LB
  - UK/USA/Singapore: <5
- *PNMR*: (2014)
  - India: 29/1000 LB
- *Still birth rate (SBR)*: (2014)
  - India: 5/1000 Total births
- *3 visits in antenatal period*: 51%
- *TT coverage in pregnancy (2 doses)*: 76%
- *Delivery in a medical facility*: 41%
- *Delivery assisted by a health professional*: 49%
- *Exclusive breast feeding < 6 months age*: 46% (WHO recommendation: 6 months)
- *Average duration of breast feeding*: 25 months (WHO recommendation: 24 months minimum)
- *Infants with LBW (<2500 gms BW)*: 28%
- *Children's Nutritional Status*:
  - Underweight: 40%
  - Stunting: 45%
  - Wasting: 23%
- *Anemia*:
  - Women: 55%
  - Men: 13%
  - Children 6–59 months: 70%
- *AIDS awareness*:
  - Men: 84%
  - Women: 61%
- *Domestic Violence ever experienced by women*: 35%

IV. DISEASES

- *Human Avian Influenza H5N1*:
  - Global: 844 cases & 449 deaths in 16 countries (WHO 2015)
  - Zero confirmed cases in India
- *Human Avian Influenza H7N9*:
  - Global: 687 cases & 272 deaths China (WHO 2015)
  - Zero confirmed cases in India
- *SARS*:
  - Global: 8422 cases with 916 deaths in 30 countries (WHO 2003)
  - Zero confirmed cases in India
- *Malaria (2014)*:
  - 0.8 m cases (67% *P. falciparum* most common) with 379 deaths
  - API: 1.10
- *Leprosy (NLEP, 2015)*:
  - Prevalence rate: 0.68/10000 (Elimination achieved on Dec 2005)
  - ANCDR: 9.73/100,000

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- *Tuberculosis (RNTCP 2013)*:
  - One-fourth of global cases
  - 53 New Smear positive cases per Lac population
  - SS+ve: Incidence – 171 per 100,000 and Prevalence – 211 per 100,000)
  - 100 % DOTS coverage in India achieved in March 2006

	Infection of TB	Disease TB
Incidence	1–2 %	1.5 per 1000
Prevalence	30–40 %	4 per 1000

- *HIV/ AIDS (NACO; 2015)*:
  - General adult population HIV+ prevalence: 0.26 % (Manipur 1.15% Highest)
  - No. of HIV+: 2.12 m
  - Male: Female = 3:2
  - MC age group 30–49 years
  - Maximum AIDS cases: Tamil Nadu (43%)
- *Poliomyelitis (NPSP; December 2015)*: [India declared 'POLIO-FREE' on 27 March 2014 by WHO]
  - No. of Polio cases: ZERO
  - No. of Vaccine derived Polio virus (VDPV) cases: 02 (both P2)
  - No. of AFP cases: 41,327
  - AFP rate: 10.47
  - Non-polio AFP rate: 09.57

V. CENSUS OF INDIA 2011

- *Total population*: 1210 million population as on 00.00 hrs 1st March 2001
- *Sex ratio*: 940 females per 1000 males
  - *Child-sex ratio*: 914 girls per 1000 boys (0-6 yrs age)
- *Dependency ratio*: 54 per 100 (0.54)
- *Density of population*: 382 persons per square km
- *Literacy Level (aged 7 yrs and older)*: 74%
  - Males 82%
  - Females 65%)
- *Growth rate*:
  - Decadal Growth Rate: 17.64%
  - Annual Growth Rate: 1.64%

(*Compiled by Dr Vivek Jain from multiple sources)

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ANNEXURE

16 Honors in Health and Medicine

Honor(s)	Scientist
*Father of Antisepsis/ Modern surgery**	Joseph Lister
*Father of Bacteriology**	Robert Koch
Father of Biochemistry	Carl Alexander Neuberg
Father of Biology/ Zoology	Aristotle
Father of Computed Tomography (CT)	Godfrey Hounsefield
Father of Endocrinology	Thomas Addison
Father of Epidemiology/ Modern Epidemiology, Greatest doctor	John Snow
Father of Evidence based Medicine	DL Sackett
Father of Genetics	Gregor Mendel
Father of Gynecology	J Marion Sims
Father of Histology	Marie-Francois Xavier Bichat
Father of Homeopathy	Samuel Hahneman
Father of Indian Medicine	Charaka
Father of Indian Pharmacology	Ram Nath Chopra
Father of Indian Surgery/ Plastic & Cosmetic surgery	Sushruta
Father of Interventional Radiology	Charles T Dotter
Father of Medical Ultrasound	John J Wild
Father of Medicine/ Modern medicine, First True Epidemiologist	Hippocrates
Father of Microbiology	Louis Pasteur
Father of Modern medicine	William Osler
Father of Modern/ Microscopic/ Cellular pathology	Rudolf Virchow
Father of Modern anatomy	Andreas Vesalius
Father of Modern laparoscopy	Camran Nezhat
Father of Modern microbiology	Louis Pasteur
Father of Modern pharmacology	Oswald Schmiedeberg
Father of Modern toxicology	Matheiu Orfila
Father of Nutrition	Antoine Lavoisier
Father of Obstetric ultrasound	Ian Donald
Father of Pediatrics	Abraham Jocobi
Father of Physiology	Claude Bernard
Father of Psychoanalysis	Sigmund Freud
Father of Public health	Cholera
Father of Radiology/ Diagnostic radiology/ X-rays	WC Roentgen
*Father of Sociology**	Karl Marx
Father of Surgery/ Modern surgery	Ambroise Pare
Father of Veterinary medicine	Renetus Vegatius
Hindu God of Medicine	Dhanvantari

(*Multiple scientists have been given these honors)

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ANNEXURE 17

High Level Expert Group (HLEG) Report on Universal Health Coverage (UHC)

Definition of UHC

- Ensuring equitable access for all Indian citizens to affordable, accountable, appropriate health services of assured quality as well as public health services addressing the wider determinants of health, with the government being the guarantor and enabler

Five Levels of Health Care

- Level 1: Villages, Community level in Urban areas
- Level 2: Sub Health Centers (SHCs)
- Level 3: Primary Health Centers (PHCs)
- Level 4: Community Health Centres (CHCs)
- Level 5: District Hospitals, Medical Colleges, Other tertiary care institutions

Urban Health Care System

Urban Family Walfare Centres (UFWC)	Urban Health Posts (UHP)
Type I: 1 per 10000–25000 population Type II: 1 per 25000–50000 population Type III: 1 per >50000 population	Type A: 1 per <5000 Type B: 1 per 5000–10000 Type C: 1 per 10000–20000 Type D: 1 per 25000–50000

Other Recommendations

- 3-year Bachelor of Rural Health Care (BRHC) degree program (cadre of rural health care practitioners for recruitment and placement at SHCs)
- National Health and Medical Facilities Accreditation Unit (NHMFAU): Regulatory and accreditation body on management and institutional reforms
- Setting District Health Knowledge Institute: DHKI for districts with population > 500,000

Key Targets of HLEG on UHC

Parameter/ Norm	Target	Current situation
Beds per 1000 population	2 beds per 1000 population by 2022	0.9 per 1000 population
ASHA* per 1000 population	2 per 1000 per population	1 per 1000 population
Nurse/ Midwives per 1 doctor	3 per 1 doctor by 2025	1.5 per 1 doctor
Doctor per 1000 population	1 per 1000 by 2027	0.5 per 1000 population
Health personnel per 10000 population	23 per 10,000 population	12.9 per 10,000 population
Staff at Sub Health Centre	2 ANM, 1 MHW + 1 BRHC	2 ANM, 1 MHW
Staff at PHC	Existing staff + 1 AYUSH doctor, 1 Dentist, 1 More allopathic doctor, 1 MHW	15 Total staff (including 1 allopathic doctor)
Staff at CHC	Existing staff + Total 19 nurses, 1 Head nurse, 1 Physiotherapist, 1 MHW	30–31 Total staff
Government spending on Health care	2.5% of GDP by 2017 3% of GDP by 2022	1.2% of GDP
Public health expenditure on health care	7.0% of GDP by 2017 8.6% by 2022	4.1% of GDP

(* ASHA = Community Health Worker; # Doctors + Nurses + Midwives; BHRC Bachelor of Rural Health care; MHW Male Health Worker)

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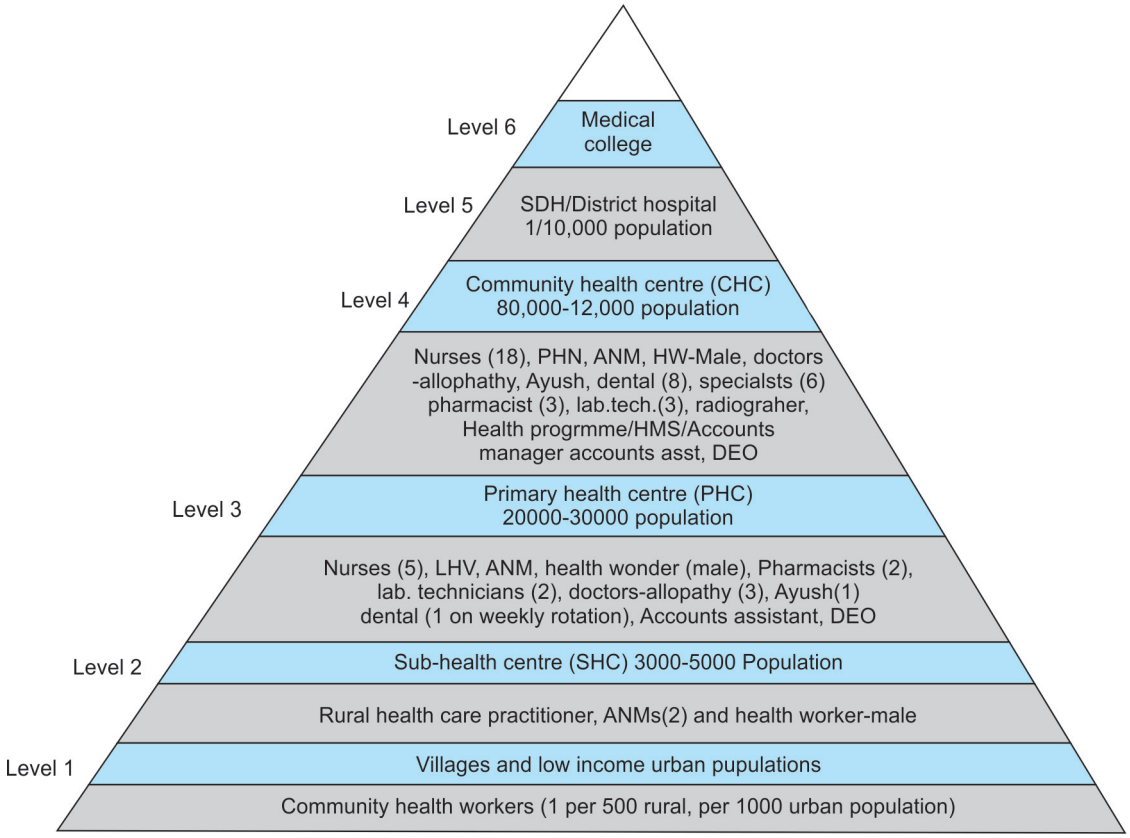
HEALTHCARE DELIVERY ARCHITECTURE: ILLUSTRATIVE STRUCTURE OF NORMS


Level 6
Medical college
Level 5
SDH/District hospital 1/10,000 population
Level 4
Community health centre (CHC) 80,000-12,000 population
Nurses (18), PHN, ANM, HW-Male, doctors -allophathy, Ayush, dental (8), specialsts (6) pharmacist (3), lab.tech.(3), radiograher, Health progrmme/HMS/Accounts manager accounts asst, DEO
Level 3
Primary health centre (PHC) 20000-30000 population
Nurses (5), LHV, ANM, health wonder (male), Pharmacists (2), lab. technicians (2), doctors-allopathy (3), Ayush(1) dental (1 on weekly rotation), Accounts assistant, DEO
Level 2
Sub-health centre (SHC) 3000-5000 Population
Rural health care practitioner, ANMs(2) and health worker-male
Level 1
Villages and low income urban pupulations
Community health workers (1 per 500 rural, per 1000 urban population)

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SECTION 2 Topic-Wise Theory MCQs and Explanations

1. History of Medicine
2. Concepts of Health and Disease
3. Epidemiology and Vaccines
4. Screening of Disease
5. Communicable and Non-communicable Diseases
6. National Health Programmes, Policies and Legislations in India
7. Demography, Family Planning and Contraception
8. Preventive Obstetrics, Paediatrics and Geriatrics
9. Nutrition and Health
10. Social Sciences and Health
11. Environment and Health
12. Biomedical Waste Management, Disaster Management, Occupational Health, Genetics and Health, Mental Health
13. Health Education and Communication
14. Health Care in India, Health Planning and Management
15. International Health
16. Biostatistics

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CHAPTER

1 History of Medicine

PRIMITIVE MEDICINE

Homeopathy System of Medicine

- *Principles of Homeopathy system of medicine*:
  - *First principle – 'similia similibus curenter'*Q: Homeopathy is system of pharmaco-dynamics based on treatment of disease by use of small amounts of a drug that, in healthy persons, produces symptoms similar to those of the disease being treated (known as 'Human drug pathogenicity study')
  - *Second principle*: Single medicine at the time of treatment
  - *Third principle*: Minimum dose to be used
- *Founding Father of Homeopathy*: Samuel HahnemannQ (GermanyQ)

I Founding Father of Homeopathy: Samuel Hahnemann

Ayurveda System of Medicine

- Ayurveda means the *'science of life'*
- *Tridosha theory of disease*Q: Disease occurs when there is disequilibrium in three doshas (humors), namely, Vata (wind), Pitta (gall) and Kapha (mucus)

I Germ theory of disease: Louis Pasteur

Siddha System of Medicine

- Siddha means *'achievement'*
- Is practiced in Tamil speaking parts in India and abroad
- Based on notion that medical treatment has to take into account the patient's environment, age, sex, race, physiological constitution, etc.

Unani System of Medicine

- Originated from GreeceQ
- *'Based on the humoral theory'*Q: Blood, phlegm, yellow bile and black bile
- Patient's character: Sanguine, phlegmatic, choleric and malancholic

Profounders of Theories in Public Health

- *Germ theory of disease*Q: Louis Pasteur
- *Multi-factorial causation of disease*: PattenkofferQ
- *Spontaneous generation theory*: AristotleQ

I First vaccine developed: Small pox

Discoveries, Inventions and Developments

- *First vaccine developed*Q: Small pox (Edward Jenner)
- *Term 'Vaccination'*Q: Edward Jenner
- *Term 'Vaccine'*Q: Louis Pasteur
- *Vaccines- Anthrax, Rabies*: Louis Pasteur
- *First Polio Vaccine*: Jonas Salk
- *Penicillin (First antibiotic)*: Alexander FlemingQ
- *Growth Chart*: David MorleyQ
- *Homeopathy*: Samuel Hahnemann
- *Blood group types*: Karl Landsteiner
- *Citrus fruits in prevention of Scurvy*: James Lind
- *Transmission of Yellow fever*: Walter Reed
- *Life cycle of Plasmodium*: Ronald RossQ

I Life cycle of Plasmodium: Ronald Ross

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I The Canon of Medicine: Avicenna

Authors of Important Books in Public Health

- *The Canon of Medicine*: Avicenna[Q]
- *The Book on Healing*: Avicenna
- *Antiseptic Principle of the Practice of Surgery*: Joseph Lister[Q]
- *Air, Water and Places*: Hippocrates[Q]
- *Ayurvedic Text Nidana*: Madhav
- *Charaka Samhita*: Charaka
- *Susruta Samhita*: Susruta

I Air, Water and Places: Hippocrates

Important Contributors in Public Health

Hippocrates

- Also known as: Father of Medicine, First True Epidemiologist[Q]
- Wrote book: Air, Water and Places[Q]
- First physician to reject superstitions, legends and beliefs that credited supernatural or divine forces with causing illness
- Hippocratic school held that all illness was the result of an imbalance in the body of the four humors, blood, black bile, yellow bile and phlegm
- First to describe clubbing

I **Hippocrates**
Also known as: Father of Medicine, First True Epidemiologist

Sushruta

- Wrote *'Sushruta Samhita'*
- Is also known as *'Father of Plastic Surgery and Cosmetic Surgery'*
- Is regarded as *'Father of Indian Surgery'*[Q]

SCIENTIFIC MEDICINE

John Snow

- *John Snow*, an English epidemiologist, studied Cholera[Q] (1848-54) and established the role of drinking water in its spread (Causative agent was identified much later)
- John Snow is also known as,
  - *Father of Epidemiology/Modern Epidemiology*[Q]
  - *Greatest doctor*
- John Snow studied and calculated dosages for use of ether and chloroform as surgical anesthesia

I **Sushruta**
Is regarded as 'Father of Indian Surgery'

History of Cholera

- *John Snow* (1813-1858): Found the link between cholera and contaminated drinking water (1854 using *Spot maps*[Q])
- *William Budd* concluded that spread of typhoid was by drinking water
- *Robert Koch* microscopically identified *V. cholerae* as bacillus causing the disease (1885)
- *Father of Public Health*: Cholera (Father of PH is a disease, *not a person*)

I **John Snow**
Father of Epidemiology/ Modern Epidemiology

Some Important Honours

- *Father of (Modern) Medicine*: Hippocrates[Q]
- *Father of Indian Medicine*: Charaka[Q]
- *Hindu God of Medicine*: Dhanvantari
- *Father of (Modern) Surgery*: Ambroise Pare
- *Father of Indian Surgery*: Sushruta[Q]
- *Father of Epidemiology/Modern Epidemiology*: John Snow[Q]
- *Father of Bacteriology*: Louis Pasteur[Q]
- *Father of Biology*: Aristotle

I Father of Public Health: Cholera

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- *Father of Genetics*: Gregor Mendel[Q]
- *Father of (Modern) Anatomy*: Vesalius[Q]
- *Father of Physiology*: Claude Bernard
- *Father of Psychoanalysis*: Sigmund Freud[Q]
- *Father of Homeopathy*: Samuel Hahneman[Q]

Edward Jenner

- Discovered Small Pox vaccine in 1796
- Small pox vaccine was the *'First Vaccine'* to be discovered[Q]
- Small Pox is the *'First and Only'* disease to be eradicated [Poliovirus 2 eradicated on 20 Sep 2015]
- Term *'Vaccination'* was coined by Edward Jenner

Louis Pasteur

- Gave the *'Germ theory of disease'*
- Coined term *'Vaccine'*
- Developed *'Vaccines for Rabies and Chicken Cholera'*
- Techniques of *'Sterilization'* and *'Pasteurization'*

MODERN MEDICINE

AYUSH[Q]

- ISM&H (Indigenous Systems of Medicine and Homeopathy) have been now re-designated as *'AYUSH system'* of medicine
  - **A**yurveda
  - **Y**oga and Naturopathy
  - **U**nani
  - **S**iddha
  - **H**omeopathy
- Mainstreaming of AYUSH is a key component of National Rural Health Mission (NRHM) 2005-12

REVOLUTION IN MEDICINE

Types of Medicine

- *State Medicine*: Provision of free medical services to the people at government expense
- *Socialized Medicine*[Q]: Provision of medical service and professional education by the State (as in state medicine), but the programme is operated and regulated by professional groups rather than by government
  - Prevents competition between practitioners and clients
  - Provision of medical services supported by state government
  - Ensures social equity that is universally operated by professional health services
- *Social medicine*: Study of the social, economical, environmental, cultural, psychological and genetic factors, which have a bearing on health

I Socialized Medicine programme is operated and regulated by professional groups rather than by government

First Country Honours

- *First country to socialize medicine completely*[Q]: Russia
- *First country to introduce compulsory sickness insurance*[Q]: Germany
- *First country to start family planning programme*: India
- *First country to start blindness control programme*: India
- *First country to establish finger printing bureau*[Q]: India (Calcutta, 1897)

I First country to establish finger printing bureau India

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I Quarantine period for Yellow fever[Q]: 6 days (maximum IP)

MISCELLANEOUS

Isolation & Quarantine

- *Isolation'* is the separation for the period of communicability, of infected persons from others in such places/conditions as to prevent/limit transmission to those susceptible
  - It applies to persons who are known to be ill with a contagious disease
- *'Quarantine'* (meaning *"40 Days"*) is the restriction of activities of apparently healthy persons who have been exposed to a case of communicable disease during its period of communicability
  - *It applies to those who have been exposed to a contagious disease but who may or may not become ill*
  - *Quarantine was first applied for plague*[Q]
  - *Quarantine period for Yellow fever*[Q]: 6 days (maximum IP)
  - Quarantine currently has been *'replaced with active surveillance'*
-

	Isolation	Quarantine
Separation of	Cases	Healthy contacts of cases[Q]
Done for	Cases themselves	Other persons around
Level of Prevention[Q]	Secondary (Treatment)	Primary (Specific Protection)
Duration	Till recovery (period of communicability)	Till maximum incubation period[Q]

Smallpox Eradication

I WHO declared global eradication of smallpox[Q]: 8th May 1980

- *Last case of smallpox in world*[Q]: 26th October 1977 (Somalia)
- *WHO declared global eradication of smallpox*[Q]: 8th May 1980
- *Last indigenous case of smallpox in India*: 17th May 1975 (Bihar)
- *Last known case of smallpox in India*: 24th May 1975 (Importation from Bangladesh)
- *India declared smallpox free*: July 1975

Few Important Diseases in Public Health

I 8th day disease: Tetanus neonatorum

I Koch's Phenomenon: Tuberculosis

- *Father of Public Health*: Cholera[Q]
- *Barometer of Social Welfare*: Tuberculosis
- *Slims' Disease*: HIV/AIDS[Q]
- *Black Sickness*: Kala Azar (Leishmaniasis)[Q]
- *Black Death*: Plague[Q]
- *Cerebrospinal fever*: Meningococcal meningitis
- *Break-bone fever*: Dengue[Q]
- *Monkey fever/ disease*: KFD (Kyasanur Forest Disease)[Q]
- *5-day fever*: Trench fever
- *8th day disease*: Tetanus neonatorum[Q]
- *100-day cough*: Pertussis (Whooping cough)
- *Koch's Phenomenon*: Tuberculosis[Q]
- *Hansen's disease*: Leprosy[Q]
- *Rubeola:* Measles
- *Rubella:* German measles[Q]
- *Rubula:* Mumps

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Institutes of Public Health Importance in India

Institute	Location
Central Drug Research Institute (CDRI)Q	Lucknow
Central Leprosy Training & Research Institute (CLTRI)	Chengalpattu
Central Research Institute	Kasauli
Haffkine Institute	Mumbai
LRS Institute of T.B & allied Diseases	New Delhi
National Tuberculosis Institute (NTI)Q	Bangalore
National Environmental Engineering Research Institute (NEERI)Q	Nagpur
National AIDS Control Organisation (NACO)	New Delhi
National Institue of Communicable Disease(NICD)	New Delhi
National Institue of Virology (NIV)	Pune
National Institute of Nutrition (NIN)	Hyderabad
National JALMA Institute for Leprosy	Agra
Tuberculosis Research Institute (TRC)	Chennai
National Institute of Occupational Health (NIOH)Q	Ahmedabad
National Institute Mental Health and Neurosciences (NIMHANS)	Bangalore
National Institute of EpidemiologyQ	Chennai

I National Tuberculosis Institute (NTI): Bangalore

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MULTIPLE CHOICE QUESTIONS

PRIMITIVE MEDICINE

1. **Samuel Hahneman is referred to as Founding Father of:** *[AIIMS Nov 1993]*
   (a) Ayurveda
   (b) Allopathy
   (c) Homeopathy
   (d) Yoga

2. **Match the following authors and their books:**
   A. Sushruta, I-Airs, Water and Places
   B. Avicenna, II-Sushruta Samhita
   C. Hippocrates, III-Canon of Medicine
   (a) A-III, B-I, C-II *[AIIMS May 1995]*
   (b) A-III, B-II, C-I
   (c) A-II, B-I, C-III
   (d) A-II, B-III, C-I

3. **Who is known as 'First True Epidemiologist' in history of medicine?** *[AIIMS Sep 1996]*
   (a) John Snow
   (b) Hippocrates
   (c) James Lind
   (d) Joseph Lister

4. **Match the following:** *[AIPGME 1994]*
   A. Sushruta, I-Hindu God of Medicine
   B. Dhanvantari, II-Father of Public Health
   C. Hippocrates, III-Father of Medicine
   D. Cholera, IV-Father of Indian Surgery
   (a) A-III, B-IV, C-II, D-I
   (b) A-IV, B-III, C-II, D-I
   (c) A-IV, B-I, C-III, D-II
   (d) A-I, B-IV, C-II, D-III

5. **Sushruta Samhita was translated by:** *[PGI June 03]*
   (a) Galen
   (b) Celsus
   (c) Harnel
   (d) Charak
   (e) Hessler

6. **Father of Indian Surgery is:** *[Recent Question 2012]*
   (a) Dhanvantari
   (b) Charaka
   (c) Susruta
   (d) Atreya

Review Questions

7. **Cradle of civilization is:** *[Bihar 2006]*
   (a) Mesopotamia
   (b) Haddapa
   (c) Mohenjodaro
   (d) Sindhu ghati

8. **Which medicine claims to be the World's first organized body of medical knowledge?** *[PGMCET 2015]*
   (a) Indian
   (b) Chinese
   (c) Egyptian
   (d) Mesopotamian

SCIENTIFIC MEDICINE

9. **Match the following:** *[AIIMS Nov 1993]*
   A. Pattenkoffer, I-Spontaneous Generation Theory
   B. Louis Pasteur, II-Germ Theory of Disease
   C. Aristotle, III-Multifactorial Causation of Disease
   (a) A-III, B-I, C-II
   (b) A-III, B-II, C-I
   (c) A-II, B-I, C-III
   (d) A-II, B-III, C-I

10. **Match the following Pioneers of Preventive Medicine and their achievements:** *[AIPGME 1996]*
    A. Edward Jenner, I-Transmission of Yellow Fever
    B. James Lind, II-Vaccination against Smallpox
    C. Walter Reed, III-Prevention of Scurvy
    (a) A-III, B-I, C-II
    (b) A-III, B-II, C-I
    (c) A-II, B-I, C-III
    (d) A-II, B-III, C-I

11. **Which of the following is known as "Father of Public Health"?** *[AIIMS Feb 1997]*
    (a) Tuberculosis *[Recent Question 2013, 2014]*
    (b) Cholera
    (c) John Snow
    (d) Louis Pasteur

12. **Smallpox vaccine was introduced by:**
    (a) Paul Ehrlich *[AIIMS Dec 1992]*
    (b) Robert Koch *[DNB 2011, MP 2003]*
    (c) Louis Pasteur
    (d) Edward Jenner

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13. **Malarial parasite was discovered by:**
    (a) Robert Koch *[Recent Question 2013]*
    (b) Louis Pasteur
    (c) Charles Alphonse Laveran
    (d) Ronald Ross

14. **James Lind is related to the discovery of:**
    (a) Prevention of scurvy *[DNB December 2010]*
    (b) Cause of scurvy
    (c) Pathogenesis of scurvy
    (d) All

15. **Theory of web of causation was given by:**
    [Recent Question 2013] [DNB December 2010]
    (a) McMohan and Pugh
    (b) Pettenkoffer
    (c) John snow
    (d) Louis Pasteur

Review Questions

16. **Who discovered the transmission of malaria by Anopheline mosquitoes?** *[TN 2003]*
    (a) Ronald Ross *[Recent Question 2013]*
    (b) Laveran
    (c) Muller
    (d) Pampana

MODERN MEDICINE

17. **Elimination of following diseases in India is on the anvil except:** *[AIPGME 2001]*
    (a) Yaws
    (b) Leprosy
    (c) Malaria
    (d) Kala Azar

18. **Yoga is considered a part of Modern medicine. It will be a part of:**
    (a) Physiotherapy *[AIPGME 2012]*
    (b) Preventive medicine
    (c) Therapeutic medicine
    (d) Caloric upsurper

19. **The lawyer who designed the Public Health Act 1848 was:** *[Recent Question 2013]*
    (a) John Snow
    (b) Edwin Chadwick
    (c) Joseph Lister
    (d) William Farr

20. **James Lind is known for:**
    [Recent Question 2012] [Recent Question 2013]
    (a) Germ theory of disease
    (b) Multifactorial causation of disease
    (c) Prevention of scurvy by citrus fruits
    (d) Web of causation

21. **Edward Jenner died in:**
    [Recent Question 2012] [Recent Question 2013]
    (a) 1749
    (b) 1775
    (c) 1823
    (d) 1920

22. **Term 'Social Medicine' was introduced by** *[Recent Question 2015]*
    (a) Jules Guerin
    (b) Crew
    (c) John Ryle
    (d) Alfred Grotjhan

REVOLUTION IN MEDICINE

23. **Socialized medicine is:** *[AIIMS Nov 2006]*
    (a) Health care at people's expense
    (b) Charitable care at government expense
    (c) Free medical care at government expense, regulated by professional groups
    (d) Integration of social medicine with health care

24. **All of the following are true about Socialized medicine except:** *[AIIMS November 2011]*
    (a) Ensures social equity - universal coverage
    (b) Reduces competition among practitioners
    (c) Use state funds for free medicine
    (d) Increase utilization of health facilities

25. **'Secret of national health lies in the homes of people' statement by:** *[Recent Question 2012]*
    (a) Indira Gandhi
    (b) Abraham Lincoln
    (c) Joseph Bhore
    (d) Florence Nightingale

26. **First bacterium discovered as cause of a disease was:** *[Recent Question 2014]*
    (a) TB bacillus
    (b) Leprosy bacillus
    (c) Anthrax bacillus
    (d) Plague bacillus

MISCELLANEOUS

27. **Quarantine was first applied for:**
    (a) HIV/AIDS *[AIPGME 2005]*
    (b) Tuberculosis
    (c) Leprosy
    (d) Plague

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28. Match the following: *[AIIMS May 2001]*

A. Edward Jenner, I- Rabies and Anthrax
B. Louis Pasteur, II- Small pox
C. Albert Calmette and Camille Guérin, III- Poliomyelitis
D. Pierre Lépine, IV- Tuberculosis

(a) A-II, B-I, C-IV, D-III
(b) A-II, B-III, C-IV, D-I
(c) A-IV, B-I, C-III, D-II
(d) A-I, B-IV, C-II, D-III

29. WHO declared that smallpox has been eradicated in:

(a) May 1978 *[AIPGME 1991]*
(b) September 1984
(c) May 1980
(d) July 1987

30. Which of the following diseases is known as "Barometer of Social Welfare" ? *[AIIMS May 1995]*

(a) Tuberculosis
(b) Cholera
(c) Leprosy
(d) Malaria

31. Breast Feeding Week is celebrated on: *[Recent Question 2012, 2013, 2014]*

(a) 1st week of March
(b) 1st week of July
(c) 1st week of August
(d) 1st December

32. Black death is: *[Recent Question 2013]*

(a) Plague
(b) Dengue
(c) Tuberculosis
(d) Cholera

33. World Health Day is celebrated on: *[DNB June 2011]*

(a) 1st December
(b) 31st May
(c) 7th April
(d) 8th May

34. Who is regarded as Father of Public Health?

(a) Louis Pasteur *[DNB June 2011]*
(b) Cholera
(c) John snow
(d) Robert Koch

Review Questions

35. 3 day disease is: *[Bihar 2004]*

(a) Rubella
(b) Rubeola
(c) Roseola infantum
(d) Measles

36. Origin of SPM dates back to: *[TN 2005]*

(a) 17th Century
(b) 18th Century
(c) 19th Century
(d) 20th Century

37. Socialization of medicine means: *[RJ 2007]*

(a) Study of man as a social being in his total environment
(b) Provision of medical services and professional education by the state but operated and regulated by the government
(c) Provision of medical services and professional education by the state but operated and regulated by professional groups rather than by the government
(d) Study of man as a social being in his whole life

38. Benefit of socialization of medicine are all except:

(a) It eliminate competition among physicians in search of clients *[RJ 2007]*
(b) It ensures social equity and universal coverage
(c) Medical care becomes free for the patients, which is supported by the state
(d) Patients can get good quality of treatment without cost

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EXPLANATIONS

PRIMITIVE MEDICINE

1. **Ans. (*c*) Homeopathy** *[Ref. Park 23/e p2]*
   - *Founding Father of Homeopathy:* Samuel Hahnemann (Germany)

Also Remember

HOMEOPATHY:

- *Principle of Homeopathy system of medicine:*
  - First principle –'similia similibus curenter': In healthy persons, produces symptoms similar to those of the disease being treated (known as 'Human drug pathogenicity study').
  - Second principle: Single medicine at the time of treatment
  - Third principle: Minimum dose to be used
- ISM and H (Indigenous Systems of Medicine and Homeopathy) have been now re-designated as 'AYUSH system' of medicine
  - **A**yurveda
  - **Y**oga and Naturopathy
  - **U**nani
  - **S**iddha
  - **H**omeopathy

2. **Ans. (*d*) A-II, B-III, C-I** *[Ref. Park 23/e p2-4]*
   - *Authors of important books in Public Health:*
     - *The Canon of Medicine:* Avicenna
     - *The Book on Healing:* Avicenna
     - *Antiseptic Principle of the Practice of Surgery:* Joseph Lister
     - *Air, Water and Places:* Hippocrates
     - *Ayurvedic Text Nidana:* Madhav
     - *Charaka Samhita:* Charaka
     - *Susruta Samhita:* Susruta

3. **Ans. (*b*) Hippocrates** *[Ref. K. Park 23/e p3]*

   HIPPOCRATES:
   - Also known as: *Father of Medicine, First True Epidemiologist*
   - Wrote book: *Air, Water and Places*

Also Remember

- *James Lind* gave the concept that Citrus fruits can prevent/cure Scurvy (Later found to be due to deficiency of Vitamin-C/ Ascorbic Acid)
- *Joseph Lister is also known as 'Father of Anti-sepsis'*

4. **Ans. (c) A-IV, B-I, C-III, D-II** *[Ref. Park 23/e p2, 3]*

   See Annxure 16

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Also Remember

- *Sushruta:*
  - Wrote '*Sushruta Samhita*'
  - Is also known as '*Father of Plastic Surgery and Cosmetic Surgery*'
  - Father of Surgery: *Ambroise Pare*
- *Hippocrates:*
  - Is also known as '*First true epidemiologist*'
  - Wrote book '*Airs, Waters and Places*'

5. **Ans. (e) Hessler** *[Ref. Internet]*
6. **Ans. (c) Susruta** *[Ref. K. Park 23/e p2]*

Review Questions

7. **Ans. (a) Mesopotamia** *[Ref. Park 23/e p3]*
8. **Ans. (b) Chinese** *[Ref. Park 23/e p2]*
   - Chinese medicine claims to be the World's first organized body of medical knowledge, dating back to 2700 BC
   - Based on 2 principles: Yang and Yin

SCIENTIFIC MEDICINE

9. **Ans. (b) A-III, B-II, C-I** *[Ref. Park 23/e p6, 34]*
   - *Profounder of theories in Public Health:*
     - Germ theory of disease: Louis Pasteur
     - Multi-factorial causation of disease: Pattenkoffer
     - Spontaneous generation theory: Aristotle

Also Remember

- Order of appearance/acceptance of theories in Public Health: Spontaneous Generation Theory, Germ Theory of Disease, Multifactorial Causation of Disease

10. **Ans. (d) A-II, B-III, C-I** *[Ref. Park 23/e p6]*
11. **Ans. (b) Cholera** *[Ref. Park 23/e p5]*
    - *Father of Public Health* is cholera disease, not a person
12. **Ans. (d) Edward Jenner** *[Ref. K. Park 23/e p6]*
    - Edward Jenner discovered Smallpox vaccine in 1796
      - Smallpox vaccine was the 'First Vaccine' to be discovered
      - Smallpox is the 'First and Only' disease to be eradicated [Poliovirus 2 eradicated on 20 Sep 2015]
      - Term 'Vaccination' was coined by Edward Jenner

Also Remember

- Paul Ehrlich coined terms '*Chemotherapy*' and '*Auto-immunity*' and giving '*Magic Bullet for Syphilis- Salvarsan*'

13. **Ans. (c) Charles Alphonse Laveran** *[Ref. Physiology of Medicine 1901-21 by J Lindsten, 1/e p261]*
14. **Ans. (a) Prevention of scurvy** *[Ref. K. Park 23/e p6]*
15. **Ans. (a) McMohan and Pugh** *[Ref. K. Park 23/e p34]*

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Review Questions

16. **Ans. (a) Ronald Ross** *[Ref. Park 23/e p6]*

MODERN MEDICINE

17. **Ans. (c) Malaria** *[Ref. Park 23/e p255]*
    - *Malaria:* Total cases in India annually were 1.31 million (2011)
    - *Yaws:*
      - Causative agent is *Treponema pertenue*
      - *'Yaws has been declared Eliminated from India in September 2006'.*
    - *Leprosy:*
      - 'Leprosy Elimination was achieved in India by 31st December 2005'
      - Elimination level for Leprosy is *'<1/10,000'*
    - *Kala Azar:*
      - Total cases in India annually were 33,133 (2011)
      - The National Health Policy (2002) had set the goal for '*Elimination of Kala-Azar by year 2010'*

Also Remember

- India has eliminated 4 diseases till date:
  1. Guinea Worm/ Dracunculiasis (Feb 2000)
  2. Leprosy (Dec 2005)
  3. Yaws (Sep 2006)
  4. Maternal & Neonatal Tetanus (Aug 2015)

18. **Ans. (*b*) Preventive medicine** *[Logical reasoning]*
19. **Ans. (b) Edwin Chadwick** *[Ref. K. Park 23/e p5]*
20. **Ans. (c) Prevention of scurvy by citrus fruits** *[Ref. K. Park 23/e p6]*
21. **Ans. (c) 1823** *[Ref. K. Park 23/e p6]*
22. **Ans. (a) Jules Guerin** *[Ref. Dictionary of Medical Sociology by Joseph, 1/e p119]*
    - Alfred Grotjhan gave concept of Social pathology

REVOLUTION IN MEDICINE

23. **Ans. (c) Free medical care at government expense, regulated by professional groups** *[Ref. Park 23/e p10]*
    - *State Medicine*: Provision of free medical services to the people at government expense
    - *Socialized Medicine:* Provision of medical service and professional education by the State (as in state medicine), but the programme is operated and regulated by professional groups rather than by government
      - Prevents competition between practitioners and clients
      - Provision of medical services supported by state government
      - Ensures social equity that is universally operated by professional health services
    - *Social Medicine:* Study of the social, economical, environmental, cultural, psychological and genetic factors, which have a bearing on health

Also Remember

- First country to socialize medicine completely: Russia

24. **Ans. (d) Increase utilization of health facilities** *[Ref. Park 23/e p10]*
    - Socialized medicine cannot ensure increased utilization of health services alone; it requires 'Community participation (Health by the people)' also

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25. **Ans. (d) Florence Nightingale** *[Ref. Recent Advances in Public Health by JL Burn, 1/e p203]*
26. **Ans. (c) Anthrax bacillus** *[Ref. Living in a Microbial World by Bruce V Hopkin, 1/e p126]*

MISCELLANEOUS

27. **Ans. (d) Plague** *[Ref. Park 22/e p106]*
28. **Ans. (a) A-II, B-I, C-IV, D-III** *[Ref. K. Park 23/e p6]*

Also remember

- *Louis Pasteur:*
  - Gave the 'Germ theory of disease'
  - Coined term 'Vaccine'
  - Developed 'vaccines for Rabies and Chicken cholera'
  - Techniques of 'Sterilization' and 'Pasteurization'

29. **Ans. (c) May 1980** *[Ref. Park 23/e p143]*
    - *WHO declared global eradication of smallpox: 8th May 1980*

Also remember

- Eradication is defined as 'termination of transmission of infection completely by extermination of the infectious agent'
  - Globally only one disease (Smallpox) has been eradicated till date [Poliovirus 2 eradicated on 20 Sep 2015]
- Few important dates in Public Health:
  - 7th April 1948: Constitution of WHO came into force
  - 8th May 1980: WHO declared eradication of Smallpox

30. **Ans. (a) Tuberculosis** *[Ref. Park 23/e p172]*
31. **Ans. (c) 1st week of August** *[Ref. Disaster Nursing and Emergency Preparedness by TG Veenema, 3/e p2]*
    - *Theme for WBFW 2014:* Breast feeding - A winning goal for life!
32. **Ans. (a) Plague** *[Ref. Bubonic Plague: Black Death by S. Person, 1/e p1]*
33. **Ans. (c) 7th April** *[Ref. K. Park 23/e p919]*
34. **Ans. (b) Cholera** *[Ref. K. Park 23/e p5]*

Review Questions

35. **Ans. (a) Rubella** *[Ref. Park 23/e p150]*
36. **Ans. (b) 18th Century** *[Ref. Park 23/e p5]*
37. **Ans. (c) Provision of medical services and professional education by the state but operated and regulated by professional groups rather than by the government** *[Ref. Park 23/e p10]*
38. **Ans. (d) Patients can get good quality of treatment without cost** *[Ref. Park 23/e p10]*

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CHAPTER

2 Concepts of Health and Disease

HEALTH AND WELL-BEING

WHO Definition of Health[Q]

- *WHO [1948] definition of Health*: Health is a state of complete physical, mental and social well being, and not merely an absence of disease or infirmity; *[recently amplified to include* –) and an ability to lead a socially and economically productive life)
  - Is an *'idealistic goal rather than a realistic proposition'*
  - It does not regard health as a dynamic concept (but as a state)

Standard of Living

- *Standard of Living*: Refers to the usual scale of our expenditure, goods we consume and services we enjoy
- *Standard of living [WHO] includes:*[Q]
  - Income and Occupation
  - Standards of housing, sanitation and nutrition
  - Level of provision of health, educational, recreational and other services
- Standard of living depends on *'Per capita GNP'*

> I Standard of living depends on 'Per capita GNP'

HDI & PQLI

Human Development Index (HDI)

- *HDI values range*[Q]: 0 to + 1
  - HDI India is 0.609 (Rank 130 out of 188 countries) [2015]
- *Human poverty index [HPI] is complementary to HDI*[Q]

> I HDI is a composite index comprising of 3 dimensions[Q]:
> - Knowledge
> - Income
> - Longevity

Estimation of HDI by New Method (2010 onwards)

- *Goalposts for HDI:*

Dimension	Country	Maximum value	Minimum value
Life expectancy	Japan	83.4	20.0
Mean years of schooling	Czech Republic	13.1	0
Expected years of schooling	*Capped at*	18.0	0
Combined education index	New Zealand	0.978	0
Per capita income (PPP $)	Qatar	107,721	100

- Calculation of each dimension index:

$$= \frac{\text{Actual value} - \text{Minimum value}}{\text{Maximum value} - \text{Minimum value}}$$

- HDI is Geometric mean of 3 dimension indices = $I_{Life}^{1/3} \times I_{Education}^{1/3} \times I_{Income}^{1/3}$

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Human Development Index [HDI] Vs Physical Quality of Life Index [PQLI]Q

	HDI	PQLI
Components	1. Longevity – Life expectancy at birth (LE_B/ LE_0) 2. Income (Real GDP per capita in PPP US$) 3. Knowledge (Mean years of schooling – Gross enrolment ratio & Literacy rate)	1. Life expectancy at 1 year age (LE_1) 2. Infant mortality rate (IMR) 3. Literacy rate
Range	0 to +1	0 to 100
Value of India	0.609	65

I HDI values rangeQ: 0 to + 1

Human Poverty Index (HPI)

- *HPI measures*: Deprivation in basic dimensions of human development
- *HPI is complimentary to*: Human Development Index (HDI)
- *(Components of HPI – I (Used for developing countries)*:Q
  - Probability at birth of not surviving to age 40
  - Adult Illiteracy Rate
  - Un-weighted average of two indicators:
    - % population not using an improved water source
    - % children underweight-for-age
- *Components of HPI – II (Used for developed countries)*:
  - Probability at birth of not surviving to age 60
  - % adults (aged 16-65 years) lacking functional literacy skills
  - % people living below poverty line (BPL)
  - Rate of long term unemployment (12 months or more)

INDICATORS OF HEALTH

Mortality and Morbidity Indicators

Mortality indicators	Morbidity indicators
Crude Death Rate Expectation of LifeQ Infant Mortality Rate Child Mortality Rate Under-5 proportionate mortality rate Maternal Mortality Rate Proportional Mortality Rate Disease-specific Mortality Rate	Incidence & Prevalence Notification Rates Attendance Rates at hospitals, etc. Admission, readmission and discharge rates Duration of hospital stay Spells of sickness

I Life Expectancy is a 'Positive mortality indicator'

- Life Expectancy is a *'Positive mortality indicator'*Q

Sullivan's Index

I 'Disability free life expectancy, DFLE = Sullivan's Index

- *Sullivan's Index* = Life Expectancy *MINUS* Duration of disability (bed disability and inability to perform major activities)Q
  - Is known as *'Disability free life expectancy (DFLEQ)'*

Disability Adjusted Life Years [DALYs]

I DALY is BEST measure of burden of disease in a defined population

- Is BEST measure of burden of disease in a defined population and the effectiveness of interventionsQ
- It expresses years lost to premature death and years lived with disability (adjusted for its' severity)
- DALYs can measure *'both mortality and disability together'*
- DALY = YLL (Years of lost life) + YLD (Years lost to disability)
- One DALY = One year of healthy life lost
- Standards of Life expectancy used: Japan life expectancy statistics.

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Quality Adjusted Life Years (QALYs)

- QALY is a measure of both quality and quantity of life lived
- QALY is years of life lived in perfect health
- QALY is used in assessing the value of money of a medical intervention

Years of Potential Life Lost (YPLL)

- *Definition*: YPLL is based on Years of life lost through premature death
- *Importance*:
  - YPLL occurs before the age to which a dying person could have expected to survive
  - YPLL is a type of mortality indicator

Socio-economic Indicators [Mnemonic: He FLAGGED]Q

- **H**ousing
- **F**amily size
- **L**iteracy rate
- **A**vailability per capita calorie
- **G**NP per capita
- **G**rowth rate
- Un**E**mployment level
- **D**ependency ratio

Case Fatality Rate (CFR)

- CFR represents *'killing power of a diseaseQ'*
- It is *'closely related to virulence of organismQ'*
- CFR = Total no. of deaths due to a disease/Total no. of cases due to a disease X 100
- *CFR is a ProportionQ*: Always expressed in percentage
- CFR is the *'complement of Survival Rate', thus* CFR = 1 – Survival Rate
- *CFR of few important diseases*:

Diseases	Case fatality rate
Rabies	100%
Yellow fever	80%
Japanese encephalitis	30 – 35% (median 35%)
Chicken pox	< 1%

- *Limitations of CFRQ*:
  - *Time interval is not specified*
  - *Usefulness is limited for chronic diseases (CFR typically used in acute infections)*
  - *CFR for the same disease may vary in different epidemics* due to changes in agent, host and environmental factors

I
- CFR represents 'killing power of a diseaseQ'
- It is 'closely related to virulence of organismQ'

NATURAL HISTORY OF DISEASE

Iceberg Phenomenon of Disease

- *Iceberg Phenomenon of disease*: Disease in a community may be compared to an iceberg
  - *Floating tip*: What physician sees in community (Clinical cases)
  - *Vast submerged portionQ*: Hidden mass of disease (Latent, inapparent, pre-symptomatic and undiagnosed cases and carriers)
  - *Line of demarcation (water surface)*: Is between apparent and inapparent infectionsQ

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I Line of demarcation (water surface): Is between apparent and inapparent infections

- *'Epidemiologist is concerned with Hidden portion of iceberg'* whereas Clinician is concerned with Tip of iceberg[Q]
- *'Screening is done for Hidden portion of Iceberg'* whereas diagnosis is done for tip of iceberg[Q]
- *Iceberg phenomenon of disease is not shown by*[Q]:
  - Rabies
  - Tetanus
  - Measles
  - Rubella

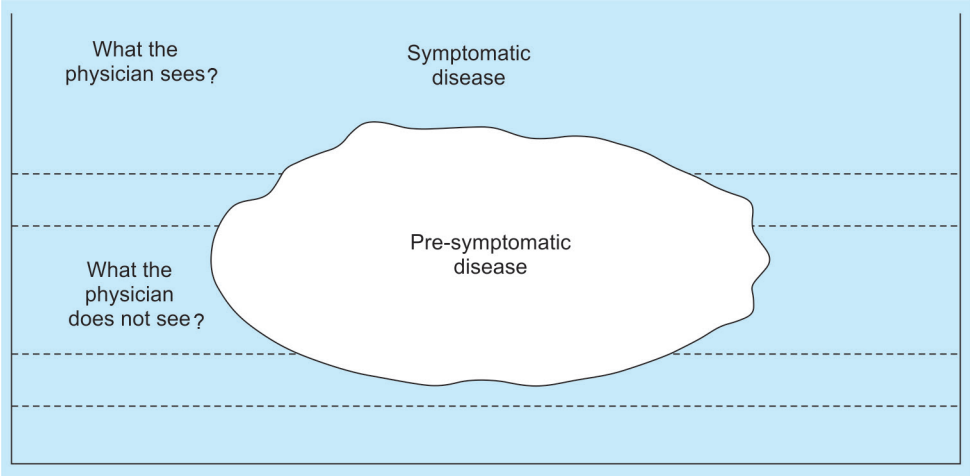

Figure: The iceberg of disease

I Epidemiological triad: Interaction between agent, host and environment

Prepathogenesis Phase of Disease

- Is period before onset of disease in man (man at risk)
- *Epidemiological triad:* Interaction between agent, host and environment[Q]
- Primary level of prevention is possible[Q]

Pathogenesis Phase of Disease

- Begins with: 'Entry of organism' in susceptible host
- Multiplication of organism, disease initiation and progression
- Final outcome may be recovery, disability or death
- Host may become a clinical case, subclinical case or carrier
- Secondary and tertiary levels of prevention are possible[Q]
- Screening of disease may improve prognosis and increase survival

CONTROL OF DISEASE

Surveillance

- *Surveillance*: Is the ongoing systematic collection and analysis of data and the provision of information which leads to action being taken to prevent and control a disease, usually one of an infectious nature[Q]
- *Surveillance is of many types*:
  1. *Passive Surveillance*: Data is itself reported to the health system
     - Example: A patient with fever coming on his own to the PHC, CHC, Dispensary, Private Practitioner, Hospital
     - Most of the national health programmes in India rely on Passive Surveillance for morbidity and mortality data collection

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2. *Active Surveillance*: Health system seeks out 'actively' the collection of data, i.e., goes out to community to collect data
   - Example: Health worker goes house to house every fortnight to detect fever cases, collect blood slides (under malaria component of National Vector Borne Disease Control Program[Q])
   - *Active Surveillance in National Health Programmes of India*: Is seen in NVBDCP (Health worker goes house to house every fortnight to detect fever cases, collect blood slides and provide presumptive treatment under malaria component) and National Leprosy Elimination Programme (Modified Leprosy Elimination Campaigns)
3. *Sentinel Surveillance*: Monitoring of rate of occurrence of specific conditions to assess the stability or change in health levels of a population, It is also the study of disease rates in a specific population to estimate trends in larger population
   - Example: Use of health practitioners to monitor trends of a health event in a population
   - Helps in *'identifying missing cases'* and *'supplementing notified cases[Q]'*
   - Sentinel Surveillance is done in National AIDS Control Program wherein STD Clinics, ANC Clinics are sentinel sites to monitor trends[Q]

I Sentinel Surveillance
Helps in *'identifying missing cases'* and *'supplementing notified cases'*

Monitoring Versus Surveillance[Q]

Monitoring	Surveillance
Performance and analysis of routine measurements aimed at detecting changes in environment or health status of a population	Continuous scrutiny of the factors that determine the occurrence and distribution of disease and other conditions of ill-health
One Time linear activity	Continuous Cycle
No feedback present	Feedback present
No inbuilt action component present	Inbuilt action component present
Stops once disease is eliminated/eradicated	Continues even after disease is eliminated/ eradicated
Smaller concept	Broader concept

Disease Control

- Disease control primarily refers to *'Primary and Secondary Levels'* of prevention
- *Sequence of Disease Control*:
  - Disease Control
  - Disease Elimination
  - Disease Eradication

Concepts of Control of Disease

- *Disease control*: Is reducing the transmission of disease agent to such a low level that it ceases to be a public health problem
  - *It aims at reducing[Q]*:
    - Incidence of the disease
    - Duration of the disease
    - Effects of infection
    - Financial burden to the community
- *Disease elimination*: Is complete interruption of transmission of disease in a defined geographical area, but the causative organism may be persisting in environment[Q]
  - *Disease elimination is a 'geographical term'*, i.e. can be used only for a country or a region
  - *India has eliminated 3 diseases till date*:
    - Guineaworm (Dracunculiasis): February 2000
    - Leprosy: December 2005 (Elimination criterion[Q]: <1/10,000)
    - Yaws: Sep 2006
    - MT and NNT [Aug 2015]

I *Disease elimination:* Is complete interruption of transmission but organism persist in environment

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- *Next diseases likely to be eliminated from India*: Poliomyelitis, Kala azar, Lymphatic filariasis

- *Disease eradication*: Is complete *'extermination'* of organism[Q]
  - Is *'tearing out by roots'* of a disease[Q]
  - Exhibits *'All or none phenomenon[Q]'*
  - *Disease eradication is a 'global term'*, i.e. can be used only for whole planet
    - *World has eradicated ONLY 1 disease till date*: Small pox (declared eradicated on 8 May, 1980[Q])
  - *3 next target diseases for eradication, globally*: Polio, Measles, Guineaworm
  - *Poliovirus 2 was declared eradicated on 20 Sep 2015*

I *Disease eradication: Is complete 'extermination' of organism*

PREVENTION OF DISEASE

Levels of Prevention

Level	Phase of disease	Objective	Interventions	Targets
Primordial	Underlying conditions lead to causation	Minimize hazards to health	Inhibit emergence of risk conditions	Total population or selected groups
Primary	Specific causal factors	Reduce incidence	Personal and community efforts	Total population, selected groups, individuals
Secondary	Early stages of disease	Shorten duration, Reduce prevalence	Early detection and prompt intervention	Individuals with established disease
Tertiary	Late stages of disease	Reduce no./ impact of complications	Lessen impact of long-term disease/disability, minimize suffering	Patients

Primordial Level of Prevention

I **Primordial prevention**
It is the *prevention of the emergence or development of risk factors*

- It is the *prevention of the emergence or development of risk factors* in countries or population groups in which they have not yet appeared[Q]
- *Modes of Intervention*:
  - Individual Education
  - Mass Education
- Is primary prevention (see below) in purest sense
- Primordial Level is *Best level of prevention for Non-communicable diseases*[Q]

Primary Level of Prevention

- It is the *action taken prior to onset of disease*, which removes the possibility that a disease will ever occur[Q]
- *Modes of Intervention*[Q]:
  - *Health Promotion*: Is targeted at strengthening the host through a variety of approaches/ interventions,
  - Example: Health Education, Environmental modifications, Nutritional interventions, Lifestyle and behavioral changes
  - *Specific Protection*: Is targeting the prevention of disease through a specific intervention
  - Example: Contraception, Vaccines
- Primary level of prevention is applied when *'risk factors are present but disease has not yet taken place'*
- It signifies *'intervention in the Pre-pathogenesis Phase of a disease/ health problem[Q]'*

I Primary level of prevention is applied when *'risk factors are present but disease has not yet taken place'*

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Secondary Level of Prevention

- It *halts the progress of disease at its' incipient stage and prevents complications*Q
- *Modes of Intervention*Q:
- *Early Diagnosis*: Detection of disturbances while biochemical, functional and morphological changes are still reversible or prior to occurrence of manifest signs and symptoms
  - Examples: Sputum smear exam for AFB, P/S for MP
  - *Treatment*: Shortens period of communicability, reduces mortality and prevents occurrence of further cases (secondary cases) or any long term disability
    - Example: DOTS, MDT
- *Secondary level of prevention is applied when disease has possibly set in*: It attempts to arrest the disease process, seek unrecognized disease and treat it before irreversibility and reverse communicability of infectious diseases
- *National Health Programmes by Govt. of India mostly operate at Secondary level of prevention*Q
- *Secondary prevention is an imperfect tool in control of transmission of disease*: It is more expensive and less effective than primary prevention
- It is an important level of prevention for diseases like Tuberculosis, Leprosy and STDs

I **Secondary prevention**
It *halts the progress of disease at its' incipient stage and prevents complications*

Tertiary Level of Prevention

- Is applied when *disease has advanced beyond early stages*: It aims to reduce or limit impairments and disabilities, minimize suffering caused by existing departures from good health
- *Modes of Intervention*Q:
  - *Disability Limitation*: It *'prevents the transition of disease from impairment to handicap'*
    - Example: Physiotherapy in Poliomyelitis
  - *Rehabilitation*: Training and retraining of an individual to the highest possible level of functional ability; it can be medical, vocational, social or psychological
    - *Example*: Crutches in Poliomyelitis
- Tertiary level of prevention signifies *'intervention in late pathogenesis phase'*

I Tertiary level of prevention signifies 'intervention in late pathogenesis phase'

Examples of Levels of PreventionQ

- *A patient with fever and cough >3 weeks comes to DOTS Clinic for 'Sputum for AFB'*: *Early diagnosis* mode of intervention, *Secondary Level* of Prevention (as disease has possibly set in and sputum for AFB is used to confirm it as a case of tuberculosis)
- *A patient with Sputum +ve for AFB was categorized as Category I under RNTCP and started with Intensive Phase drugs*: *Treatment* mode of intervention, *Secondary Level* of prevention (as disease has been diagnosed and now treatment has been started)
- *A patient with fever and chills comes to Malaria Clinic for 'Peripheral Smear for MP'*: *Early diagnosis* mode of intervention, *Secondary Level* of prevention (as disease has possibly set in and peripheral smear for malarial parasite is used to confirm it as a case of Malaria)
- *A patient with fever and chills comes to Malaria Clinic and was given Presumptive Treatment/Radical Treatment*: *Treatment* mode of intervention, *Secondary Level* of prevention (as disease has possibly set in and now treatment has been started)
- *A person sleeps inside a bednet*: *Specific Protection* mode of intervention, *Primary Level* of prevention (risk factors, i.e, mosquitoes are already present, disease has not yet taken place)
- *A child coming to Immunization clinic for OPV Vaccine*: *Specific Protection* mode of intervention, *Primary Level* of prevention (risk factors, i.e, polio infection already present, disease has not yet taken place)

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- *A Urine strip for sugar detection was employed to screen diabetics in a community*: *Early diagnosis* mode of intervention, *Secondary Level* of prevention (screening is meant for early diagnosis of a disease)
- *A village community was given health education to prevent spread of malaria*: *Health Promotion* mode of intervention, *Primary Level* of prevention (to enable/strengthen the host)
- *A 20 yr old male takes chemoprophylaxis during an epidemic of Meningococcal meningitis*: *Specific Protection* mode of intervention, *Primary Level* of prevention (risk factors, i.e, epidemic of meningococcal meningitis is already present; disease has not yet taken place in that male)
- *A class of 5 yr old children is discouraged from adopting harmful lifestyles, smoking, etc.*: *Primordial Level* of prevention (intervention before emergence of risk factors)
- *A child afflicted with poliomyelitis is given crutches to walk*: *Rehabilitation* mode of intervention, *Tertiary Level* of prevention

Disease-Impairment-Disability-Handicap

- *Disease*: Any abnormal condition of an organism that impairs function
- *Impairment*: Any loss or abnormality of psychological, physiological or anatomical structure or function
- *Disability*: (Because of impairment,) any restriction or inability to perform an activity in a range considered normal for a human being
- *Handicap*: A disadvantage for a given individual, resulting from an impairment/disability, that limits/prevents fulfillment of a role considered normal (depending on age, sex, social, cultural factors) for that individual

For Example,

Event	Classification	Interpretation[Q]
Accident	*Disease*	Impairs function of a person
Loss of foot	*Impairment*	Loss of anatomical structure in the form of foot
Cannot Walk	*Disability*	Walking is a normal routine daily activity of a human being
Unemployed	*Handicap*	Loses out his job because he cannot walk, so cannot fulfill his role in the society, i.e, earning for his family members

ICD – 10

International Classification of Diseases, 10th revision/edition [ICD-10][Q]

I ICD-10: International Statistical Classification of Disease

- ICD-10 is an abbreviation for the International Statistical Classification of Disease and Related Health Problems (10th revision)
  - Uniform classification for morbidity and mortality data in world
  - International standard diagnostic classification for all general epidemiological and many health management purposes
  - ICD is revised every 10 years
- *ICD-10 came in 1993*: It covers disease, illnesses and injuries
- ICD-10 is arranged in 22 chapters[Q] (ICD-10-CM has 21 chapters)
- *ICD-10 is arranged in 3 volumes*[Q]:
  - Volume 1: Classifications, lists, nomenclature and definitions
  - Volume 2: Instruction Manual
  - Volume 3: Alphabetical index
- *Codes U 00 – U 49*: New diseases of uncertain etiology
- *Codes U 50* – U 99: Used in research

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MISCELLANEOUS

Time Distribution of Disease

- Short term fluctuations
- Long term fluctuations
- Periodic fluctuations

Short Term Fluctuations (Epidemic)

- *Definitions*:
  - Occurrence of no. of cases of a disease *'clearly in excess of normal expectancy [NE]*[Q]*'*
    - Normal expectancy is derived by looking at average of no. of cases of the disease in previous 3-5 years in that geographical area
    - If NE = zero, 'even one case is considered epidemic'
  - Statistically speaking, epidemic is when no. of cases *'exceed twice the standard deviation'*
    - No. of cases > Mean + 2SD[Q]
  - Occurrence of a new disease in a population (as NE = Zero)
  - Reoccurrence of an eliminated/eradicated disease in a population (as NE = Zero)
- *Types of epidemics*:
  - *Common-source epidemics*:
    - Single exposure or 'Point source' epidemics
    - Continuous or multiple exposure epidemics
  - *Propagated epidemics*:
    - Person-to-person
    - Arthropod vector
    - Animal reservoir
  - Slow (modern) epidemics

> **I** Epidemic:
> Occurrence of no. of cases of a disease *'clearly in excess of normal expectancy*

Periodic Fluctuations

- *Seasonal trends*: Is seasonal variation/fluctuation in occurrence of a disease:
  - Is due to vector variation, environmental factors and change in herd immunity[Q]
  - Examples:
    - Measles (early spring)
    - Upper respiratory infections (winters)
    - Gastrointestinal infections (summers)
- *Cyclical trends*: Is occurrence of a disease in cycles spread over short periods of time, which may be days, weeks, months or years:
  - Examples[Q]:
    - Measles (every 2-3 years)
    - Rubella (every 6-9 years)
    - Influenza pandemics (every 10-15 years)

> **I** *Seasonal trends:*
> Is due to vector variation, environmental factors and change in herd immunity

> **I** *Cyclical trends:*
> - Measles (every 2-3 years)
> - Rubella (every 6-9 years)

Long Term Fluctuations [Secular Trends]

- Implies changes in occurrence of a disease (progressive increase or decrease) over a long period of time, generally several years or decades[Q]
  - Is the consistent tendency to change in a particular direction or a definite movement in one direction[Q]
- *Examples:*
  - Communicable diseases (Poliomyelitis, Diphtheria, Pertussis) are reducing in India in past few decades
  - Non-communicable diseases (Diabetes, Hypertension, Obesity) are increasing in India in past few decades.

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MULTIPLE CHOICE QUESTIONS

HEALTH AND WELL-BEING

1. Definition of health given by WHO includes which of the following dimensions: *[PGI Dec 01]*
(a) Social
(b) Physical
(c) Mental
(d) Emotional
(e) Economic

2. Standard of Living (WHO) includes all except:
(a) Income *[AIPGME 2006]*
(b) Sanitation and nutrition
(c) Level of provision of health
(d) Human rights

3. Living standard of people is best assessed by:
(a) Infant mortality rate *[DPG 2011]*
(b) Maternal mortality
(c) Physical quality of life index
(d) Death rate

4. Human living standards can be compared in different countries by *[Recent Question 2013]*
(a) HDI
(b) PQLI
(c) HPI
(d) DALY

5. Ottawa Charter of health promotion incorporates all of the following key action areas *except*: *[PGMCET 2015]*
(a) Build healthy public policy
(b) Strengthen community action for health
(c) Build social security system
(d) Reorient health services

HDI AND PQLI

6. Human Development Index (HDI) does not include:
(a) Mean years of schooling *[AIPGME 1999]*
(b) Life expectancy at age 1 *[AIIMS May 01, May 05]*
(c) Real GDP per capita *[Recent Questions 2014]*
(d) Adult literacy rate

7. The Physical Quality of the Life Index considers

[AIIMS May 2006, AIIMS Nov 2006, AIPGME 2000, 06, 07, AIIMS Nov 06, Karnataka 2011, Recent Question 2013, Karnataka 2006, 2008, PGI 2008, 2001, DNB 2002, 2005, Bihar 2003, UP 2004, AP 1996, 2005, MP 2000, RJ 2005]

I. Expectancy of life at birth
II. Expectancy of life at age one
III. Infant mortality rate
IV. Literacy rate

Of these components:
(a) I alone is correct
(b) I, III and IV are correct
(c) I, II and III are correct
(d) II, III and IV are correct

8. Minimum and Maximum Values established for calculation of Life Expectancy index in HDI are:
(a) 0 years and 65 years *[AIPGME 2007]*
(b) 0 years and 85 years *[Recent Question 2013]*
(c) 25 years and 85 years
(d) 0 years and 100 years

9. Human Development Index (HDI) values range between: *[AIIMS Jan 2003]*
(a) –1 to +1
(b) 0 to 1
(c) 0 to 3
(d) 1 to 3

10. PQLI stands for: *[Karnataka 2004]*
(a) Physical quality of life index
(b) Physical quantity of life index
(c) Physiological quality of life index
(d) Psychological quality of life index

11. HDI includes: *[PGI Dec 07, June 04]*
(a) Infant mortality rate *[DPG 2006]*
(b) Life expectancy at birth *[PGI May 2011]*
(c) Life expectancy at 1 yr *[AIIMS May 2015]*
(d) Adult literacy rate
(e) GDP

12. All of the following are included in Human development index (HDI) except:

[AIPGME 2011, DNB 2003, Kolkata 2004, Karnataka 2007, MP 2005, AI 2000, MH 2007, MH 2002, MH 2006, AP 2008, JIPMER 2001]

(a) Life expectancy at birth
(b) Life expectancy at 1 year age
(c) Education
(d) Gross domestic product (GDP)

13. Not included in the human poverty index is
(a) % of population not surviving up to 40 yrs age
(b) Underweight for age *[AIIMS May 2013]*
(c) Occupation
(d) % population not using safe water supply

14. HDI of India is
(a) 0.500 *[Recent Question 2013]*
(b) 0.545
(c) 0.505
(d) 0.540

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15. **Poverty index does not include deprivation of** *[DNB June 2010]*
    (a) Long life
    (b) Knowledge
    (c) Standard of living
    (d) Income

16. **In construction of Education Index in HDI which is not true?** *[AIIMS May 2014]*
    (a) 2/3 adult literacy considered
    (b) 1/3 gross enrolment considered
    (c) Gross enrolment of secondary education is considered and not primary education
    (d) Minimum and maximum values are used based on global data

17. **PQLI lies between** *[Recent Question 2014]*
    (a) 0 and 1
    (b) 0 and 10
    (c) 0 and 100
    (d) 1 and 10

INDICATORS OF HEALTH

18. **Which of the following is a Mortality Indicator?**
    (a) Life Expectancy *[AIIMS May 1993]*
    (b) Notification Rate
    (c) DALY
    (d) Bed turn-over ratio

19. **Modified Kuppuswamy scale include all criteria for socioeconomic status except:** *[AIPGME 2007]*
    (a) Income per capita
    (b) Education of head of family
    (c) Occupation of head
    (d) Income of head

20. **Expectation of life, free of disability is known as:**
    (a) Park's index *[AIPGME 2006]*
    (b) Smith's index *[UP 2005]*
    (c) Sullivan's index
    (d) Life index

21. **Which is the best index for burden of disease?**
    (a) Case fatality rate *[AIIMS June 1197]*
    (b) Disability adjusted life years
    (c) Dependency ratio
    (d) Morbidity data

22. **Which of the following is a measure of the burden of disease in a defined population and effectiveness of interventions?** *[AIIMS Nov2001]*
    (a) Park's index
    (b) Disability adjusted life year
    (c) Bed disability days
    (d) Activities of daily living index

23. **Which one of the following is NOT a socioeconomic indicator?** *[AIIMS Dec 1997]*
    (a) Literacy rate
    (b) Family size
    (c) Housing
    (d) Life expectancy at birth

24. **Most universally accepted indicator of health status of whole population and their socioeconomic conditions among the following is:** *[AIIMS Nov 2001]*
    (a) MMR
    (b) IMR
    (c) Life expectancy
    (d) Disease notification rates

25. **Sullivan index indicates:** *[AIIMS Dec 1994]*
    (a) Life free of disability
    (b) Hookworm eggs/gm of stool
    (c) Standard of living
    (d) Pregnancy rate per HWY

26. **Virulence of a disease is indicated by:** *[AIPGME 01]*
    (a) Proportional mortality rate
    (b) Specific mortality rate
    (c) Case fatality rate
    (d) Amount of GDP spent on control of disease

27. **All the following indicators are used to measure disability rates in a community except:** *[DPG 2011]*
    (a) Sullivan's Index
    (b) Human Poverty Index
    (c) Health Adjusted Life Expectancy
    (d) Disability Adjusted Life Year

28. **Which of the following is true about DALYs?**
    (a) Life is adjusted for disease *[AIPGME 2012]*
    (b) Premature death is adjusted for disability *[Recent Question 2012]*
    (c) Life expectancy free of disability
    (d) Years lost to premature death and years lived with disability adjusted for severity of disability

29. **Burden of disease is given by** *[Recent Question 2013]*
    (a) Incidence
    (b) Crude death rate
    (c) Cause specific death rate
    (d) Proportional mortality rate

30. **In a village with population of 5000, 50 people have a disease and 10 of them died. What is case fatality rate?**
    (a) 1% *[Recent Question 2013] [DNB December 2009]*
    (b) 2%
    (c) 0.5%
    (d) 20%

31. **Best indicator of availability, utilization and effectiveness of health services** *[Recent Question 2012]*
    (a) IMR
    (b) MMR
    (c) Hospital bed occupancy rate
    (d) DALY

32. **One DALY signifies** *[DNB December 2010]*
    (a) 1 year of disease free life
    (b) 1 lost year of healthy life
    (c) 1 month of bedridden life
    (d) None of these

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33. **DALE has been replaced by** *[Recent Question 2012]*
    (a) DALY
    (b) QALY
    (c) HALE
    (d) DFLE

34. **Fifty people are suffering from cholera in a population of 5000. Out of 50, suffering from cholera, 10 died. But the total deaths are 50. What is the death rate?** *[Recent Question 2012]*
    (a) 1 per 1000
    (b) 5 per 1000
    (c) 10 per 1000
    (d) 20 per 100

35. **Communicability of disease is assessed by**
    (a) Secondary attack rate *[DNB December 2011]*
    (b) Generation time
    (c) Serial interval
    (d) Incubation period

36. **Sullivan index is** *[DNB 2008]*
    (a) Measures disability
    (b) Measures life years adjusted with disability
    (c) Measures life expectancy adjusted without disability or free of disability
    (d) Measures life expectancy

37. **For optimum utilization of health services in a hospital, Bed turnover interval should always be** *[JIPMER 2014]*
    (a) Slightly positive
    (b) Largely positive
    (c) Slightly negative
    (d) Largely negative

Review Questions

38. **Health indicators are used for:** *[Bihar 2005]*
    (a) Health status of community
    (b) Requirement of health needs
    (c) Assess rate of infection
    (d) To meet basic needs

39. **DALY is:** *[UP 2008]*
    (a) Disease – Adjusted Life year
    (b) Disability Adjusted Life year
    (c) Disease Associated Life year
    (d) Disability Associated Life year

40. **Which of the following is best to compare the vital statistics of countries?** *[MH 2007]*
    (a) Crude death and birth rates
    (b) Age standardized death rate
    (c) Age specific death rate
    (d) Proportional mortality rate

41. **Most important health status indicator of a country:**
    (a) Life expectancy at birth *[MH 2007]*
    (b) Maternal mortality rate
    (c) Total fertility rate
    (d) Infant mortality rate

42. **Disability adjusted life year (DALY) Expresses the:** *[RJ 2006]*
    (a) Extent of disability in the population
    (b) Expectation of life free of disability
    (c) Years of life lost to premature death
    (d) Lost year of life due to premature death and disability

NATURAL HISTORY OF DISEASE

43. **'Silent epidemic' of the century is:**
    (a) Coronary artery disease *[AIPGME 02]*
    (b) Chronic liver disease
    (c) Chronic obstructive lung disease
    (d) Alzheimer's disease

44. **Which one of the following does not represent the submerged portion of the iceberg?**
    (a) Diagnosed cases under treatment
    (b) Undiagnosed cases *[AIIMS Jan 1999]*
    (c) Pre-symptomatic cases
    (d) Carriers sub clinical cases

45. **In "Tip of Iceberg Phenomenon", submerged portion does not consist of** *[AIIMS Feb 1997]*
    (a) Latent period
    (b) Carriers
    (c) Undiagnosed cases
    (d) Healthy population

46. **Which of the following is NOT true regarding pathogenesis of a disease?** *[AIPGME 2012]*
    (a) Screening is of no use in changing course of disease
    (b) Tertiary prevention is possible
    (c) Entry of organism occurs
    (d) Includes subclinical cases

47. **Web of causation of disease, which statement is most appropriate?** *[Recent Question 2013]*
    (a) Mostly applicable for common diseases
    (b) Requires complete understanding of all factors associated with causation of disease
    (c) Epidemiological ratio
    (d) Helps to suggest ways to interrupt the risk of transmission

48. **Transition from increased prevalence of infectious pandemic diseases to manmade disease is known as**
    (a) Paradoxical transition *[AIIMS November 2012]*
    (b) Reversal of transition
    (c) Epidemiological transition
    (d) Demographic transition

49. **BEINGS Model of disease causation does not include**
    (a) Spiritual factors *[NUPGET 2013]*
    (b) Social factors
    (c) Religious factors
    (d) Social factors

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50. Secular trend is best demonstrated by
(a) Line diagram *[DNB December 2010]*
(b) Bar graph
(c) Stem-leaf plot
(d) Box and whisker plots

Review Questions

51. Epidemiological triad are all *except*: *[UP 2000]*
(a) Host *[Recent Questions 2014]*
(b) Environmental factors *[RJ 2000]*
(c) Agent
(d) Investigator

52. When a child 'lost' his hands and unable to do routine works called as: *[UP 2005]*
(a) Handicap
(b) Disability
(c) Impairment
(d) Battered baby syndrome

53. Natural history of disease is best studied by:
(a) Cross sectional study *[Kolkata 2004]*
(b) RCT
(c) Case-control study
(d) Cohort study

54. The period preliminary to the onset of disease in man, when the disease agent has not yet entered man but the factors favouring its interaction with human host exist in the environment is known as:
(a) Incubation period *[MP 2006]*
(b) Pre-pathogenesis period
(c) Pathogenesis period
(d) Pre-symptomatic period

CONTROL OF DISEASE

55. Measures involved in sentinel surveillance includes all of the following *except*:
(a) Identifying missing cases in notification of diseases *[DNB 2008, AIPGME 2001, AIIMS Nov 1999]*
(b) Identifying new cases of infection
(c) Identifying old and new cases
(d) Identifying cases free of disability

56. Consider the following statements:

The term 'disease control' describes ongoing operations aimed at reducing the *[AIIMS November 2014]*
1. Incidence of disease *[AIPGME 2002]*
2. Financial burden to the community
3. Effects of infection including both physical and psychological complications
4. Duration of disease and its transmission

of these statements,
(a) 1, 2 and 3 are correct
(b) 1, 3 and 4 are correct
(c) 1, 2 and 4 are correct
(d) 1, 2, 3 and 4 are correct

57. All of the following statements about eradication programme are true *except*:
(a) There is complete interruption of disease transmission in the entire area of the community *[AIPGME 1995]*
(b) Eradication programme is over once the disease has been certified as having been eradicated
(c) Case finding is of secondary importance
(d) The objective is to eliminate the disease to the extent that no new case occurs in the future

58. Continuous scrutiny of factors that determine the occurrence and distribution of disease and other condition of ill health is the definition of: *[AIPGME 1996]*
(a) Monitoring
(b) Surveillance
(c) Disease control
(d) System analysis

59. Decrease in the incidence of a disease to a level where it ceases to be a public health problem is:
(a) Control *[DPG 2007]*
(b) Elimination
(c) Eradication
(d) Surveillance

60. Disease eliminated from India is /are:
(a) Small pox *[PGI June 08]*
(b) Guinea worm disease
(c) Yaws, Leprosy and Neonatal Tetanus
(d) Measles
(e) Polio

61. Candidates (s) for global eradication by WHO:
(a) Malaria *[PGI June 01]*
(b) Dracunculiasis
(c) Polio
(d) Measles
(e) Chicken pox

62. Disease eradicated from world: *[PGI June 03]*
(a) Small pox
(b) Guineworm
(c) Polio
(d) Diphtheria
(e) Measles

63. Causative agent is present but there is no transmission is known as: *[AIPGME 2012]*
(a) Elimination
(b) Control
(c) Eradication
(d) Holoendemic

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64. **Disease elimination is helped by** *[Recent Question 2013]*
(a) Herd immunity
(b) Isolation
(c) Quarantine
(d) None

65. **Zero incidence is** *[Recent Question 2013]*
(a) Elimination of disease
(b) Eradication of disease
(c) Elimination of infection
(d) Eradication of infection

66. **Analysis of routine measurement is aimed at detecting changes in environment** *[Recent Question 2012]* *[Recent Question 2013]*
(a) Monitoring
(b) Surveillance
(c) Isolation
(d) Evaluation

67. **All of the following are eradicable diseases except**
(a) Tuberculosis *[DNB June 2010]*
(b) Guineaworm
(c) Poliomyelitis
(d) Measles

68. **Missing cases are detected by** *[DNB December 2011]* *[DPG 2005]*
(a) Active surveillance
(b) Passive surveillance
(c) Sentinel surveillance
(d) Monitoring

69. **Sentinel surveillance is for** *[Recent Question 2012]*
(a) Border districts
(b) For malaria surveillance
(c) Effective sanitary surveillance
(d) Supplementary to routine notification

70. **Surveillance actual targets** *[Recent Question 2015]*
(a) Prevent disease
(b) Health planning
(c) Disease eradication
(d) Disease monitoring

Review Questions

71. **To eradicate measles the percentage of population to be vaccinated is at least_____%:**
(a) 70 *[DNB 2006]*
(b) 80
(c) 85
(d) 95

72. **Leprosy is considered a public health problem if the prevalence of leprosy is more than:**
(a) 1 per 10,000 *[Bihar 2004]*
(b) 2 per 10,000
(c) 5 per 10,000
(d) 10 per 10,000

73. **Disease elimination means:** *[AP 2000]*
(a) Cure of the disease
(b) Preventing the transmission totally
(c) Eradication of the vector
(d) Complete termination of infective organism

74. **Regarding disease elimination true is:**
(a) Prevention of chain of transmission
(b) Extermination of disease agent *[MP 2001]*
(c) There is no disease anywhere on planet
(d) Reducing the disease to such a level so that it will not be a major public health problem

75. **What happens in disease elimination:** *[MP 2006]*
(a) Incidence is reduced by 10%
(b) Prevalence is reduced by 10%
(c) Global eradication of disease agent
(d) Interruption of disease transmission from large geographical areas

76. **Disease elimination refers to:** *[MP 2007]*
(a) Extinction of disease agent
(b) Termination of all disease
(c) Global removal of disease agent
(d) Regional removal of disease agent

77. **In India which disease is near to elimination:**
(a) Tetanus *[RJ 2003]*
(b) Rabies
(c) Polio
(d) Mumps

PREVENTION OF DISEASE

78. **All of the following represent Specific protection mode of Disease prevention *except*:**
(a) Chemoprophylaxis for meningococcal meningitis *[AIPGME 2000]*
(b) Personal hygiene and Environmental sanitation
(c) Usage of condoms
(d) Iodisation of salt

79. **Secondary level of prevention include all of the following *except*:** *[AIIMS Jan 2000]*
(a) Health screening for Diabetes Mellitus
(b) Case finding for Falciparum Malaria
(c) Contact tracing for STIs
(d) Reconstructive Surgery in Leprosy

80. **In a population to prevent coronary artery disease changing harmful lifestyles by education is referred to as:** *[AIIMS May 2001]*
(a) High risk strategy
(b) Primary prevention
(c) Secondary prevention
(d) Tertiary prevention

81. **In an area with fluoride rich water, the defluoridation of water is which level of prevention?** *[AIIMS May 1994]*
(a) Primary (b) Secondary
(c) Tertiary (d) Primordial

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82. Which of the following is an example of Disability limitation in poliomyelitis?
(a) Reducing occurrence of polio by immunization *[AIIMS May 07 and May 2006]*
(b) Arranging for schooling of child suffering from PRPP
(c) Resting affected limbs in neutral position
(d) Providing calipers for walking

83. Which of the following is primordial prevention? *[AIIMS May 1994]*
(a) Action taken prior to the onset of disease
(b) Prevention of emergence of development of risk factors
(c) Action taken to remove the possibility that a disease will ever occur
(d) Action that halts the progress of a disease

84. 'Disability Limitation' is mode of intervention for:
(a) Primordial Prevention *[AIIMS May 2008]*
(b) Primary Prevention *[Recent Question 2013]*
(c) Secondary Prevention
(d) Tertiary Prevention

85. Which of the following is the most logical sequence? *[AIIMS Nov 2006] [Recent Question 2013]*
(a) Impairment-Disease-Disability-Handicap
(b) Disease-Impairment-Disability-Handicap
(c) Disease-Impairment- Handicap-Disability
(d) Disease-Handicap-Impairment-Disability

86. Pap smear test for detection of carcinoma of cervix is which level of prevention? *[Karnataka 2007]*
(a) Primordial *[Recent Questions 2014]*
(b) Primary
(c) Secondary
(d) Tertiary

87. A person who has lost his foot in an accident and is not able to walk is an example of: *[Karnataka 2007]*
(a) Disease
(b) Disability
(c) Impairment
(d) Handicap

88. Primary prevention of obesity: *[DPG 1998]*
(a) Low fiber diet
(b) High fiber diet
(c) High cholesterol diet
(d) High intake of protein

89. Primordial prevention in coronary heart disease:
(a) Exercise in high risk area *[PGI Dec 1997]*
(b) BP monitoring
(c) Salt restriction
(d) Statins
(e) TMT

90. Primary prevention of dental caries includes:
(a) Fluridation *[PGI June 03]*
(b) Dental health education *[PGI Dec 03]*
(c) Mass screening
(d) Dental fitting
(e) Teeth extraction

91. Which of the following is primordial prevention for NCD (non communicable disease: *[PGI June 05]*
(a) Salt restriction in high NCD area
(b) Smoking cessation in high NCE area
(c) Preservation of traditional diet in low NCD area
(d) Early diagnosis and treatment
(e) Exercise in high NCD area

92. Primary prevention: *[PGI June 05]*
(a) Marriage counseling
(b) Early diagnosis and treatment
(c) Pap smear
(d) Self breast examination
(e) Immunization

93. Vitamin A prophylaxis to a child is:
(a) Health promotion *[AIIMS May 2010]*
(b) Specific protection
(c) Primordial prevention
(d) Secondary prevention

94. Screening of the diseases is which type of prevention?
(a) Primordial *[Recent Question 2013]*
(b) Primary
(c) Secondary
(d) Tertiary

95. Which of the following is not a primary prevention strategy? *[DNB December 2011]*
(a) Breast self examination
(b) Control of tobacco
(c) Radiation protection
(d) Cancer education

96. CAD primordial prevention is by
(a) Lifestyle change *[Recent Question 2013]*
(b) Coronary bypass
(c) Treatment of CAD
(d) None

97. Quarantine period for yellow fever in India is?
(a) 6 days *[Recent Question 2012]*
(b) 1 week *[Recent Question 2013]*
(c) 10 days
(d) 2 weeks

98. Prevention of emergence of risk factor is *[DNB 2007]*
(a) Primordial prevention
(b) Primary prevention
(c) Secondary prevention
(d) Tertiary prevention

99. Immunization is *[Recent Question 2013, 2014]*
(a) Primary prevention
(b) Secondary prevention
(c) Tertiary prevention
(d) Disability limitation

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100. Iodized salt in iodine deficiency control programme is
(a) Primary prevention *[Recent Question 2012]*
(b) Secondary prevention
(c) Tertiary prevention
(d) Primordial prevention

101. Target group in Secondary prevention
(a) Healthy individuals *[Recent Question 2012]*
(b) Patients
(c) Animals
(d) Children

102. School health checkup comes under ..... level of prevention *[Recent Question 2012]*
(a) Primordial
(b) Primary
(c) Secondary
(d) Tertiary

103. Desks provided with table top to prevent neck problems is an example of *[DNB December 2010]*
(a) Primordial prevention *[Recent Question 2014]*
(b) Primary prevention
(c) Specific protection
(d) Disability limitation

104. Childhood obesity prevention is a type of
(a) Primordial prevention *[JIPMER 2014]*
(b) Primary prevention
(c) Secondary prevention
(d) Tertiary prevention

105. Monitoring of blood pressure which type of prevention
(a) Primordial *[Recent Question 2014]*
(b) Primary
(c) Secondary
(d) Tertiary

106. All of the following comes under primary prevention *except*: *[Recent Question 2014]*
(a) Pap smear
(b) Helmets
(c) Contraception
(d) Vaccines

107. Patient is on psychotherapy, what is the level of prevention *[Recent Question 2014]*
(a) Primordial
(b) Primary
(c) Secondary
(d) Tertiary

108. Which of the following is an example of primary prevention? *[PGMCET 2015]*
(a) Measles immunization
(b) Cervical cytology screening
(c) Smoking cessation after a heart attack
(d) Self examination of breast for lumps

109. Consider the following
1. Health Education
2. Treatment of hypertension
3. Screening for cervical cancer
4. Changing lifestyles to prevent stress

Which are the examples of primordial prevention? *[UPSC CMS 2015]*
(a) 1 and 4
(b) 2 and 3
(c) 1 and 3
(d) 2 and 4

Review Questions

110. Which one of the following is primary prevention:
(a) Active treatment *[DNB 2001]*
(b) Vaccination
(c) Screening
(d) Rehabilitation

111. Prevention of emergence of risk factor is:
(a) Primordial prevention *[DNB 2007]*
(b) Primary prevention
(c) Secondary prevention
(d) Tertiary prevention

112. Iodine salt supplementation is: *[UP 2000]*
(a) Specific protection
(b) Primordial prevention
(c) Decrease the deformity
(d) Secondary prevention

113. All are health promotion strategies *except*:
(a) Insecticides spray *[Kerala 2001] [UP 2004]*
(b) Potable safe water supply
(c) Life style modification
(d) Chemoprophylaxis

114. One of the following is an example for tertiary prevention: *[AP 2000]*
(a) Vaccination
(b) Immediate diagnosis and treatment
(c) Rehabilitation
(d) Health education

115. Action which halts the progress of a disease at its incipient stage and prevents complications: *[AP 2004]*
(a) Primary prevention
(b) Primordial prevention
(c) Secondary prevention
(d) Tertiary prevention

116. The following does not determine specific protection:
(a) Pap smear for early detection of carcinoma cervix in community *[AP 2005]*
(b) Wearing of goggles by welders
(c) Wearing of seat belts by car drivers
(d) Vitamin A for children prophylaxis

117. Which is not included in primary prevention:
(a) Health education *[Kolkata 2005]*
(b) Life-style modification

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(c) Immunization
(d) Nutritional supplementation

118. Health promotion includes all *except*: *[Kolkata 2007]*
(a) Specific protection
(b) Health education
(c) Food fortification
(d) Environment modification

119. Primary prevention among following is: *[MP 2002]*
(a) Disability limitation
(b) Early diagnosis
(c) Treatment
(d) Immunization

120. Which of the following is a primary prevention in polio: *[MP 2002]*
(a) Good sanitary measures
(b) Rehabilitation
(c) Provision of 3 doses of OPV in early infancy
(d) Collection of stool sample for diagnosis

121. When you immunize a child for measles what type of prevention are you doing: *[MP 2006]*
(a) Primordial prevention
(b) Health promotion
(c) Specific protection
(d) Secondary prevention

122. First in sequence: *[MH 2002]*
(a) Impairment
(b) Disease
(c) Disability
(d) Rehabilitation

123. All are primary levels of prevention except: *[MH 2002]*
(a) Health promotion
(b) Specific protection
(c) Early diagnosis and treatment
(d) Immunization

124. Not allowing the emergence or development of the risk factor itself is which level of prevention? *[MH 2005]*
(a) Primordial
(b) Primary
(c) Secondary
(d) Tertiary

125. Level of prevention that includes Specific protection:
(a) Primordial *[MP 2004] [MH 2006]*
(b) Primary
(c) Secondary
(d) Tertiary

126. Chemoprophylaxis is prevention type: *[RJ 2000]*
(a) Primary *[RJ 2004]*
(b) Secondary
(c) Tertiary
(d) Quaternary

ICD – 10

127. ICD-10 stands for: *[AIIMS June 1997]*
(a) International Classification of Drugs, 10th revision
(b) International Classification of Disabilities, 10th revision
(c) International Classification of Diseases, 10th revision
(d) International Classification of Disasters, 10th revision

128. ICD-10 true is *[Recent Question 2013]*
(a) Revised every 5 years
(b) Consists of 10 chapters
(c) Arranged in 3 volumes
(d) Was produced by UNICEF

129. ICD-10 has how many chapters?
(a) 5 *[DNB December 2009]*
(b) 12 *[MP 2006]*
(c) 21
(d) 32

Review Questions

130. Vital ICD is reviewed once in every: *[AP 2004]*
(a) 2 years (b) 5 years
(c) 8 years (d) 10 years

131. Regarding International classification of disease untrue is: *[MH 2007]*
(a) Revised every 10 years
(b) 10th revision has 15 major chapters
(c) Is base for use in other health fields
(d) Coding system in 10th revision is alphanumerical

MISCELLANEOUS

132. Iceberg phenomenon differentiates: *[AIPGME 08]*
(a) Apparent and Inapparent
(b) Symptomatic and Asymptomatic
(c) Cases and Carriers
(d) Diagnosed and Undiagnosed

133. Maximum power of destruction of a disease is measured by: *[DPG 2006]*
(a) Survival rate
(b) Case fatality rate
(c) Specific death rate
(d) Proportional mortality rate

134. Seasonal trend is due to: *[AIPGME 01]*
(a) Vector variation
(b) Environmental factors
(c) Change in herd immunity
(d) All of the above

135. Intraspecies competition is the competition among:
(a) Species *[AIIMS Dec 1994]*
(b) Individuals of a population

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(c) Individuals of a community
(d) Populations and their regulatory factors

136. All of the statements about quarantine are true *except*:
(a) It is synonymous with isolation *[AIIMS Nov 04]*
(b) Absolute quarantine is restriction during the incubation period
(c) Exclusion of children from schools is an example of modified quarantine
(d) Quarantine should not be longer than the longest incubation period

137. According to a joint study "Healthcare In India: The Road Ahead" done by CII and McKinsey and company in 2002, India's existing bed population ratio is:
(a) 2:1000 *[AIIMS Nov 05]*
(b) 1.5:1000
(c) 9:1000
(d) 2.5:1000

138. Which of the following is characteristic of a single exposure common vehicle outbreak? *[AIIMS May 05]*
(a) Frequent secondary cases
(b) Severity increases with increasing age
(c) Explosive
(d) Cases occur continuously beyond the longest incubation period

139. Which of the following is not targeted in Millennium Development Goals (MDGs)? *[AIIMS Nov 2001]*
(a) Eradicating extreme poverty
(b) Fostering global partnership for development
(c) Reducing child mortality
(d) Improving health care delivery

140. Global eradication of small pox was done on:
(a) 26th Oct 1977 *[AIIMS Jan 1998]*
(b) 8th May 1980
(c) 17th March 1980
(d) 17th April 1977

141. Direct standardisation is used to compare mortality data of two countries. This is done because of difference in:
(a) Causes of deaths *[AIPGME 2011]*
(b) Numerators
(c) Denominators
(d) Age distribution

142. Not under Millennium development goals:
(a) Reduction of cardiovascular health hazards
(b) Eradication of extreme poverty *[DNB June 2011]*
(c) Global partnership for development
(d) Sustainability of the environment

143. True about point source epidemic is *[DNB June 2011]*
(a) Occurs in more than 1 incubation period
(b) Occurs in one incubation period
(c) The exposure is continuous
(d) Epidemic curve falls very slowly

144. Bhopal gas tragedy is an example of *[DNB 2008]*
(a) Point source epidemic
(b) Continuous epidemic
(c) Propagated epidemic
(d) Slow epidemic

145. Which of the following is a MDG?
(a) Reduce by 2/3rd the under five mortality by year 1990-2015 *[AIIMS November 2012]*
(b) Halve the prevalence of HIV-AIDS by 2015
(c) Reduce maternal mortality by 50%
(d) Combat PEM & Diarrhea

146. Millennium development goals aim to reduce MMR by *[DNB June 2011]*
(a) 3/4
(b) 2/3
(c) 1/4
(d) 1/2

147. Long term fluctuation is seen with
(a) Cyclic trends *[DNB December 2011]*
(b) Epidemics
(c) Secular trends
(d) Seasonal trends

148. True about continuous common source epidemics *[Recent Question 2012]*
(a) High secondary attack rate
(b) Duration more than one incubation period
(c) Rapid rise and fall of epidemic curve
(d) Brief and simultaneous exposure

149. Cyclic trend is *[DNB December 2011]*
(a) Variations in herd immunity
(b) Environmental
(c) Nutritional
(d) Short term

150. An epidemic of Hepatitis A is an example of *[AP 2014]*
(a) Common source, single exposure epidemic
(b) Common source, continuous exposure epidemic
(c) Propagated epidemic
(d) Slow epidemic

151. There has been a gradual increase in number of cases of Non communicable diseases as compared to previous years. This trend is called as *[AIIMS PG May 2015]*
(a) Secular
(b) Cyclical
(c) Seasonal
(d) Periodical

Review Questions

152. Surveillance is: *[DNB 2001]*
(a) Scrutiny of factors
(b) Treatment of contacts
(c) Prevention of disease
(d) Chemoprophylaxis of disease

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153. True morbidity is measured by: *[UP 2000]*
(a) Active surveillance
(b) Passive surveillance
(c) Sentinel surveillance
(d) Continuous surveillance

154. Tip of iceberg phenomenon is mostly appropriately represented by: *[Kolkata 2002]*
(a) Malaria (b) Measles
(c) PEM (d) Rabies

155. Quarantine is isolation of healthy individual:
(a) For longest incubation period of disease *[MP 2000]*
(b) For shortest incubation period of disease *[Kolkata 2008]*
(c) For twice the incubation period of disease
(d) For period of generation time

156. Part I of the 'death certificate' deals with: *[MH 2006]*
(a) Immediate cause, and the direct underlying cause which started the whole trend of events leading to death
(b) Any significant associated diases that contributed to the death but did not directly lead to it
(c) Approximate interval between onset and cause of death
(d) The mode of death

157. Limit for registration of birth is: *[MH 2007]*
(a) 7 days
(b) 14 days
(c) 21 days
(d) Any of the above

158. In India death has to be registered with in: *[RJ 2004]*
(a) 3 days
(b) 7 days
(c) 14 days
(d) 21 days

159. Carriers are not found in: *[RJ 2005]*
(a) Typhoid
(b) Diphtheria
(c) Whooping cough
(d) Hepatitis B

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EXPLANATIONS

HEALTH AND WELL-BEING

1. **Ans. (a) Social; (b) Physical; (c) Mental; (e) Economic** *[Ref. Park 23/e p14-15]*
   - *WHO [1948] definition of Health:* Health is a state of complete physical, mental and social well-being, and not merely an absence of disease or infirmity; [recently amplified to include –) and an ability to lead a socially and economically productive life).
     - Is an 'idealistic goal rather than a realistic proposition'
     - It does not regard health as a dynamic concept (but as a state)
2. **Ans. (d) Human rights** *[Ref. Park 23/e p16]*
   - *Standard of Living:* Refers to the usual scale of our expenditure, goods we consume and services we enjoy
   - *Standard of living [WHO] includes:*
     - Income and Occupation
     - Standards of housing, sanitation and nutrition
     - Level of provision of health, educational, recreational and other services

Also Remember

- Standard of living depends on 'Per capita GNP'

3. **Ans. (c) Physical quality of life index** *[Ref. K. Park 23/e 17]*
4. **Ans. (a) HDI** *[Ref. K. Park 23/e p17]*
5. **Ans. (c) Build social security system** *[Ref. Park 23/e p30-31]*

OTTAWA CHARTER FOR HEALTH PROMOTION

Five Key action areas in health promotion	Basic strategies for health promotion
– Public Health **P**olicy	– Advocate
– Strengthen **C**ommunity action for health	– Enable
– **R**eorientation of health services	– Mediate
– Personal **S**kills development	**Health Promotion Logo**
– Supportive **E**nvironment for health	– Circle with 3 wings
[*Mnemonic*: Promotion **C**an **R**eorient **S**killed **E**nvironment]	– Incorporates 5 key action areas
	– Incorporates 3 basic strategies

ALSO REMEMBER

JAKARTA DECLARATION OF HEALTH PROMOTION

- Vision and focus on Health Promotion in 21st Century
- Focus areas:
  - Determinants of health
  - New challenges in 21st century
  - Fundamental conditions/resources for health: Peace, shelter, education, social security, social relations, food, income, women-empowerment, stable ecosystem, sustainable resource use, social justice, respect for human rights, poverty

HDI AND PQLI

6. **Ans. (b) Life expectancy at age 1** *[Ref. Park 23/e p17]*

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Also Remember

- Human poverty index [HPI] is complementary to HDI
- *Human development index [HDI] Vs Physical quality of life index [PQLI]:*

	HDI	PQLI
Indicator components	1. Longevity – life expectancy at birth (LE_B/ LEo) 2. Income (Real GDP per capita in PPP US$) 3. Knowledge (Mean years of schooling – Gross enrolment ratio and Literacy rate)	1. Life expectancy at 1 year age (LE_1) 2. Infant mortality rate (IMR) 3. Literacy rate
Range	0 to +1	0 to 100
Value of India	0.609	65

Also Remember

Human Poverty Index (HPI):

- *HPI measures:* Deprivation in basic dimensions of human development
  - HPI is complimentary to Human Development Index (HDI)

Components of HPI – I: (Used for developing countries)	*Components of HPI – II:* (Used for developed countries)
– Probability at birth of not surviving to age 40 – Adult Illiteracy Rate – Un-weighted average of two indicators: 1. % population not using an improved water source 2. % children underweight-for-age	– Probability at birth of not surviving to age 60 – % adults (aged 16-65 years) lacking functional literacy skills – % people living below poverty line (BPL) – Rate of long term employment (12 months or more)

7. **Ans. (d) II, III and IV are correct** *[Ref. Park 23/e p17]*
8. **Ans. (c) NONE** *[Ref. Park 23/e p18] [Now 20 and 83.4 years]*
9. **Ans. (b) 0 to 1** *[Ref. Park 21/e p16, Park 22/e p16]*

Also Remember

- *Few important ranges in Public Health:*

Parameter	Range (Lies between)
Correlation coefficient [r]	–1 to +1 ($-1 < r < +1$)
Coefficient of determination [r^2]	0 to +1 ($0 < r^2 < +1$)
Physical quality of life index [PQLI]	0 to +100 ($0 < PQLI < +100$)
Human development index [HDI]	0 to +1 ($0 < HDI < +1$)
Probability	0 to +1 (0% < Probability < 100%)
Sensitivity [screening test]	0% < Sensitivity < 100%
Specificity [screening test]	0% < Specificity < 100%
PPV (screening test)	0% < PPV < 100%
NPV (screening test)	0% < NPV < 100%

10. **Ans. (a) Physical quality of life index** *[Ref. Park 23/e p17]*
11. **Ans. (b) Life expectancy at birth; (d) Adult literacy rate; (e) GDP** *[Ref. Park 21/e p16, Park 22/e p16]*
12. **Ans. (b) Life expectancy at 1 year age** *[Ref. Park 23/e p17]*
13. **Ans. (c) Occupation** *[Ref. K Park 20/e p15]*
14. **Ans. NONE [CURRENT value: 0.609]** *[Ref. K. Park 23/e p18]*
15. **Ans. (d) Income** *[Ref. K. Park 23/e p18]*

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16. Ans. (c) Gross enrolment of secondary education is considered and not primary education

[Ref. HDI Report 2005, United Nations]

- HDI = Education1/3 X Income1/3 X Longevity1/3
  Where, Education = 2/3 Adult literacy rate + 1/3 Gross enrolment ratio
  (Gross enrolment ratio considers Primary, Secondary and Tertiary levels of education)
  [PLEASE NOTE: 2011 onwards New methodology for Education Index calculation in HDI by formula: Education Index = (EYSI + MYSI)/2]

17. Ans. (c) 0 and 100 *[Ref. Park 22/e p16]*

INDICATORS OF HEALTH

18. Ans. (a) Life Expectancy *[Ref. Park 23/e p24-25]*

- Life Expectancy is a 'Positive mortality indicator'

Also Remember

- DALY is a type of disability rate
- Bed turn-over ratio is a type of heath care utilization rate

19. Ans. (d) Income of head *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p17, Park 22/e p640, 39]*

- Modified Kuppuswamy scale is a 'Scale of Socio-economic Status of Urban families'. It comprises of 3 components:
  - Education Status of head of family
  - Occupation Status of head of family
  - Income per capita per month

20. Ans. (c) Sullivan's index *[Ref. Park 21/e p25, Park 22/e p23]*

- *Sullivan's Index* = Life Expectancy MINUS Duration of disability (bed disability and inability to perform major activities)
  - *It is one of the most advanced indicators currently available*

21. Ans. (b) Disability adjusted life years *[Ref. Park 23/e p26]*

- *Disability adjusted life years [DALYs]:* Is a measure of the burden of disease in a defined population and the effectiveness of interventions; It expresses years lost to premature death and years lived with disability adjusted for its' severity

Also Remember

- DALYs can measure *'both mortality and disability together'*
- Case fatality rate measures *'virulence of an organism'* or *'killing power of a disease'*
- Dependency ratio measures the *'need for society to provide for its' younger and older groups'*
- Morbidity data measures *'any departure from health'*

22. Ans. (b) Disability adjusted life year *[Ref. Park 23/e p26]*

23. Ans. (d) Life expectancy at birth *[Ref. K. Park 13/e p27]*

- *Socio-economic indicators:* **[Mnemonic: He FLAGGED]**
  - **H**ousing
  - **L**iteracy rate
  - Per capita **G**NP
  - Level of un**E**mployment
  - **F**amily size
  - **A**vailability per capitacalorie
  - **G**rowth rate
  - **D**ependency ratio

24. Ans. (b) IMR *[Ref. Park 23/e p24]*

- *Infant Mortality Rate [IMR]:* Is one of the most universally accepted indicators of health status not only of infants, but also of the whole population and the socio-economic conditions under which they live
- IMR is a sensitive indicator of availability, utilization and effectiveness of health care, particularly perinatal care
- *Infant Mortality Rate [IMR]:*
  - Infant Mortality Rate [IMR] is a rate
  - *Is the second best indicator of socio-economic development of a country:* Ultimate solution for lowering IMR lies in socio-economic development [Best indicator is U5MR]

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- Is most important indicator of health status of a community, level of living and effectiveness of MCH services in general
- IMR is among 'the best predictors of state failure'

Also Remember

- *Disability adjusted life expectancy [DALE]:* DALE brings more information than infant mortality rate (IMR) when comparing the overall health status of different populations. But, DALE is quite difficult to compute and to precisely understand. For countries with limited resources that require an easily calculated measure of population health, IMR may remain a suitable choice.
- UNICEF considers U5MR or CMR as 'single best indicator of socio-economic development and well-being' (even better than IMR)

25. Ans. (a) Life free of disability *[Ref. Park 21/e p25, Park 22/e p23]*

- The simplest index of health which incorporates morbidity as well as mortality is Sullivan's Index of Disability-Free Life Expectancy (DFLE)

Also Remember

- *Chandler's Index:* Hookworm eggs/gm of stool
- *Standard of living [WHO]:* Income and occupation, standards of housing, sanitation and nutrition, level of provision of health, educational, recreational and other services
- *Pregnancy rate per HWY:* Pearl Index (Failure rate of Contraceptives)

26. Ans. (c) Case fatality rate *[Ref. Park 23/e p58]*

CASE FATALITY RATE (CFR):

- CFR represents 'killing power of a disease'
  - It is 'closely related to virulence of organism'

$$\text{CFR} = \frac{\text{Total no. of deaths due to a disease}}{\text{Total no. of cases due to a disease}} \times 100$$

- *CFR is a Proportion:* Always expressed in percentage
- CFR is the '*complement of Survival Rate', thus* CFR = 1 – Survival Rate
- Limitations of CFR:
  - *Time interval is not specified*
  - *Usefulness is limited for chronic diseases [CFR typically used in acute infections]*
  - *CFR for the same disease may vary in different epidemics*

27. Ans. (b) Human Poverty Index *[Ref. K. Park 21/e p17-18, 25-26, Park 22/e p23, 24]*

28. Ans. (d) Years lost to premature death and years lived with disability adjusted for severity of disability *[Ref. K. Park 23/e p26]*

29. Ans. (d) Proportional mortality rate *[Ref. K. Park 23/e p25]*

30. Ans. (d) 20% *[Ref. K. Park 23/e p25, 58]*

31. Ans. (a) IMR *[Ref. K. Park 23/e p24]*

32. Ans. (b) 1 lost year of healthy life *[Ref. K. Park 23/e p26]*

33. (c) HALE *[Ref. K. Park 23/e p25]*

34. Ans. (c) 10 per 1000 *[Ref. K. Park 23/e p24]*

35. Ans. (a) Secondary attack rate *[Ref. K. Park 23/e p100]*

36. Ans. (c) Measures life expectancy adjusted without disability or free of disability *[Ref. K. Park 22/e p24]*

37. Ans. (a) Slightly positive *[Ref. Financial and Business Management for the Doctor of Nursing Practice, KT Waxman, 1/e p61]*

- Bed turn over interval: Amount of time beds at hospital are unoccupied until next patients' admission following a patients' discharge
  - Negative values: Indicate over 100% occupancy, scarcity of beds, over-utilization of services
  - Positive values: Indicate vacant beds, underutilization of services due to defective admission process or poor quality medical care
  - Slight positive values: Indicate optimum utilization of services

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Review Questions

38. **Ans. (a) Health status of community** *[Ref. Park 23/e p23-24]*
39. **Ans. (b) Disability Adjusted Life year** *[Ref. 23/e p26]*
40. **Ans. (b) Age standardized death rate** *[Ref. Park 23/e p58, 59]*
41. **Ans. (d) Infant mortality rate** *[Ref. Park 23/e p24]*
42. **Ans. (d) Lost year of life due to premature death and disability** *[Ref. Park 23/e p26]*

NATURAL HISTORY OF DISEASE

43. **Ans. (d) Alzheimer's disease** *[Ref. Park 23/e p45]*
    - *'Silent epidemic' of the century:* Alzheimer's disease

Also Remember

- *Modern epidemic:* Coronary heart disease
- *Most important discovery of 20th century:* ORS

44. **Ans. (a) Diagnosed cases under treatment** *[Ref. Park 23/e p39]*
    - *Iceberg Phenomenon of disease:* Disease in a community may be compared to an iceberg
      - Floating tip is what physician sees in community, i.e., clinical cases
      - Vast submerged portion of iceberg represents hidden mass of disease i.e., latent, inapparent, pre-symptomatic and undiagnosed cases and carriers in community
      - Line of demarcation (water surface): Is between apparent and inapparent infections
      - Water surrounding iceberg: Healthy population

Also Remember

- *'Epidemiologist is concerned with Hidden portion of iceberg'* whereas Clinician is concerned with Tip of iceberg
- *'Screening is done for Hidden portion of Iceberg'* whereas diagnosis is done for tip of iceberg
- *Iceberg phenomenon of disease is not shown by:*
  - Rabies
  - Tetanus
  - Measles
  - Rubella

45. **Ans. (d) Healthy population** *[Ref. Park 23/e p39]*
    Refer to answer 54
46. **Ans. (a) Screening is of no use in changing course of disease** *[Ref. Park 23/e p36]*
    PREPATHOGENESIS PHASE OF DISEASE
    - Is period before onset of disease in man (man at risk)
    - Epidemiological triad: Interaction between agent, host and environment
    - Primary level of prevention is possible

    PATHOGENESIS PHASE OF DISEASE
    - Begins with 'Entry of organism' in susceptible host
    - Multiplication of organism, disease initiation and progression
    - Final outcome may be recovery, disability or death
    - Host may become a clinical case, subclinical case or carrier
    - Secondary and tertiary levels of prevention are possible
    - Screening of disease may improve prognosis and increase survival
47. **Ans. (d) Helps to suggest ways to interrupt the risk of transmission** *[Ref. K. Park 23/e p34]*
48. **Ans. (c) Epidemiological transition** *[Ref. Health and Lifestyle Change, Volume 9, p8]*

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49. **Ans. (c) Religious factors** *[Ref. Community/ Public Health Nursing Practice by Maurer & Smith, 5/e p167]*

50. **Ans. (a) Line diagram** *[Ref. K. Park 23/e p846]*

Review Questions

51. **Ans. (d) Investigator** *[Ref. Park 23/e p35]*

52. **Ans. (b) Disability** *[Ref. Park 23/e p44]*

53. **Ans. (d) Cohort study** *[Ref. Park 23/e p75]*

54. **Ans. (b) Pre-pathogenesis period** *[Ref. Park 23/e p36]*

CONTROL OF DISEASE

55. **Ans. (d) Identifying cases free of disability** *[Ref. Park 23/e p40]*
    - *Surveillance:* Is the ongoing systematic collection and analysis of data and the provision of information which leads to action being taken to prevent and control a disease, usually one of an infectious nature
    - *Surveillance is of many types:*
      - *Passive Surveillance:* Data is itself reported to the health system; For e.g., A patient with fever coming on his own to the PHC, CHC, Dispensary, Private Practitioner, Hospital
      - *Active Surveillance:* Health system seeks out 'actively' the collection of data, i.e., goes out to community to collect data; For e.g., Stool sample collection from home in Polio Program.
      - *Sentinel Surveillance:* Monitoring of rate of occurrence of specific conditions to assess the stability or change in health levels of a population, It is also the study of disease rates in a specific cohort, geographic area, population subgroup, etc. to estimate trends in larger population; For e.g., Use of health practitioners to monitor trends of a health event in a population
        1. Sentinel Surveillance helps in 'identifying missing cases' and 'supplementing notified cases'

Also Remember

- *Most of the national health programmes in India rely on Passive Surveillance for morbidity and mortality data collection.*
- *Active Surveillance:* Is seen in NVBDCP (Health worker goes house to house every fortnight to detect fever cases, collect blood slides and provide presumptive treatment under malaria component) and National Leprosy Elimination Programme (Modified Leprosy Elimination Campaigns)
- Sentinel Surveillance is done in National AIDS Control Programme wherein STD Clinics, ANC Clinics have been identified as sentinel sites to monitor trends of HIV/AIDS in the country

56. **Ans. (d) 1, 2, 3 and 4 are correct** *[Ref. Park 23/e p39]*
    - Disease control primarily refers to *'Primary and Secondary Levels'* of prevention
    - *Sequence of Disease Control:*
      - Disease Control
      - Disease Elimination
      - Disease Eradication

Also Remember

- *Concepts of control of disease:*
  - *Disease control:* Is reducing the transmission of disease agent to such a low level that it ceases to be a public health problem; it aims at reducing,
    1. Incidence of the disease
    2. Duration of the disease
    3. Effects of infection
    4. Financial burden to the community

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- *Disease elimination:* Is complete interruption of transmission of disease in a defined geographical area, but the causative organism may be persisting somewhere
  1. Disease elimination is a 'geographical term', i.e. can be used only for a country or a region
  2. India has eliminated 4 diseases till date:
     i. Guineaworm (Dracunculiasis): February 2000
     ii. Leprosy: December 2005 (Elimination criterion: <1/10,000)
     iii. Yaws: Sep 2006
     iv. Maternal & Neonatal Tetanus (Aug 2015)
  3. Next diseases likely to be eliminated from India: Poliomyelitis, Kala azar, Lymphatic filariasis
- Disease eradication: Is complete 'extermination' of organism
  1. Is *'tearing out by roots'* of a disease
  2. Exhibits *'All or none phenomenon'*
  3. *Disease eradication is a 'global term'*, i.e. can be used only for whole planet
  4. *World has eradicated ONLY 1 disease till date:* Small pox (declared eradicated on 8 May, 1980)
  5. *3 next target diseases for eradication, globally:*
     i. Poliomyelitis (Poliovirus 2 was eradicated on 20 September 2015)
     ii. Measles
     iii. Guinea worm

57. Ans. (c) Case finding is of secondary importance *[Ref. Park 23/e p40]*

- *Disease eradication:*
  - In eradication, there is complete interruption of disease transmission in the entire area of the community
  - Eradication programme is over once the disease has been certified as having been eradicated
  - Case finding is of primary importance
  - Objective of eradication: Is to eliminate the disease to the extent that no new case occurs in the future

58. Ans. (b) Surveillance *[Ref. Park 23/e p40]*

Also Remember

- *Diseases under International Surveillance [WHO]:*
  - Louse borne typhus fever
  - Relapsing fever
  - Poliomyelitis
  - Malaria
  - Human Influenza
  - Rabies
  - Salmonellosis
- *Monitoring versus surveillance:*

Monitoring	Surveillance
Performance and analysis of routine measurements aimed at detecting changes in environment or health status of a population	Continuous scrutiny of the factors that determine the occurrence and distribution of disease and other conditions of ill-health
One Time linear activity	Continuous Cycle
No feedback present	Feedback present
No inbuilt action component present	Inbuilt action component present
Stops once disease is eliminated/eradicated	Continues even after disease is eliminated/eradicated
Smaller concept	Broader concept

59. Ans. (a) Control *[Ref. Park 23/e p39]*

60. Ans. (a) Small pox (b) Guinea worm disease; (c) Yaws [Leprosy and Neonatal Tetanus] *[Ref. Park 23/e p143]*

61. Ans. (b) Dracunculiasis; (c) Polio; (d) Measles *[Ref. Park 23/e p40]*

62. Ans. (a) Small pox *[Ref. Park 23/e p143]*

63. Ans. (a) Elimination *[Ref. Park 23/e p40]*

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64. **Ans. (a) Herd immunity** *[Ref. K. Park 23/e p40]*

65. **Ans. (a) Elimination of disease** *[Ref. K. Park 23/e p40]*

66. **Ans. (a) Monitoring** *[Ref. K. Park 23/e p40]*

67. **Ans. (a) Tuberculosis** *[Ref. K. Park 23/e p40]*

68. **Ans. (c) Sentinel surveillance** *[Ref. K. Park 23/e p40]*

69. **Ans. (d) Supplementary to routine notification** *[Ref. K. Park 23/e p40]*

70. **Ans. (b) Health planning** *[Ref. Park 23/e p40]*

PUBLIC HEALTH SURVEILLANCE

- Ongoing systematic collection, analysis and interpretation of outcome-specific data, closely integrated with the timely dissemination of these data to those responsible for taking public health action to prevent and control disease or injury
- Results used for national health planning, policy-setting and targeted outcomes
- Provides essential information for defining problems and taking action
- Health authorities use the information to set priorities, plan interventions, allocate resources, detect outbreaks promptly, and recognize problems during the routine analysis of data from ongoing public health programs
- Requires professional analysis and sophisticated judgement of data leading to recommendations for control activities

Review Questions

71. **Ans. (d) 95** *[Ref. Park 23/e p150]*

72. **Ans. (a) 1 per 10,000** *[Ref. Park 23/e p315]*

73. **Ans. (b) Preventing the transmission totally** *[Ref. Park 23/e p40]*

74. **Ans. (a) Prevention of chain of transmission** *[Ref. Park 23/e p40]*

75. **Ans. (d) Interruption of disease transmission from large geographical areas** *[Ref. Park 23/e p40]*

76. **Ans. (d) Regional removal of disease agent** *[Ref. Park 23/e p40]*

77. **Ans. (c) Polio;** *[Ref. Park 23/e p40]*

PREVENTION OF DISEASE

78. **Ans. (b) Personal hygiene and Environmental sanitation** *[Ref. Park 23/e 43]*
    - Specific protection mode of disease prevention: Is a Primary level of disease prevention (applied when risk factors are present in environment but disease has not yet taken place). Risk factors are already present but disease is prevented from occurring by using a specific modality. E.g., Chemoprophylaxis to prevent meningococcal meningitis, Usage of condoms to prevent pregnancy/ STIs, Iodisation of salt to prevent Iodine Deficiency Disorders.
    - Personal hygiene and Environmental sanitation is Health Promotion mode of intervention, also a type of Primary level of prevention

79. **Ans. (d) Reconstructive Surgery in Leprosy** *[Ref. Park 23/e p44]*
    - *Health screening for Diabetes Mellitus, Case finding for Falciparum malaria and Contact tracing for* STIs represent *Secondary level of prevention:* as disease has possibly set in and we want to diagnose early and provide treatment
    - *Reconstructive Surgery in Leprosy:* Disease (leprosy) with possible deformities have already taken place and we are now aiming to rehabilitate the patient through reconstructive surgery; thus it is a form of Tertiary level of prevention

80. **Ans. (b) Primary prevention** *[Ref. Park 23/e p41]*

LEVELS OF PREVENTION:

- *Primordial Level of Prevention:* Is primary prevention (see below) in purest sense
  - It is the prevention of the emergence or development of risk factors in countries or population groups in which they have not yet appeared

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- **Modes of Intervention:**
  1. Individual Education
  2. Mass Education
- Primordial Level is Best level of prevention for Non-communicable diseases

- *Primary Level of Prevention:*
  - It is the action taken prior to onset of disease, which removes the possibility that a disease will ever occur
  - **Modes of Intervention:**
    1. *Health Promotion:* Is targeted at strengthening the host through a variety of approaches/ interventions, e.g. Health Education, Environmental modifications, Nutritional interventions, Lifestyle and behavioural changes
    2. *Specific Protection:* Is targeting the prevention of disease through a specific intervention
  - Primary level of prevention is applied when *'risk factors are present but disease has not yet taken place'*
  - It signifies 'intervention in the Pre-pathogenesis Phase of a disease/ health problem'
- *Secondary Level of Prevention:*
  - It halts the progress of disease at its' incipient stage and prevents complications
  - **Modes of Intervention:**
    1. *Early Diagnosis:* Detection of disturbances while biochemical, functional and morphological changes are still reversible or prior to occurrence of manifest signs and symptoms
    2. *Treatment:* Shortens period of communicability, reduces mortality and prevents occurrence of further cases (secondary cases) or any long term disability
  - *Secondary level of prevention is applied when disease has possibly set in:* It attempts to arrest the disease process, seek unrecognized disease and treat it before irreversibility and reverse communicability of infectious diseases
  - National Health Programmes by Govt. of India mostly operate at Secondary level of prevention
  - Secondary prevention is an imperfect tool in control of transmission of disease: It is more expensive and less effective than primary prevention
  - It is an important level of prevention for diseases like Tuberculosis, Leprosy and STDs
- *Tertiary Level of Prevention:*
  - Is applied when disease has advanced beyond early stages: It aims to reduce or limit impairments and disabilities, minimize suffering caused by existing departures from good health
  - **Modes of Intervention:**
    1. *Disability Limitation:* It 'prevents the transition of disease from impairment to handicap'
    2. *Rehabilitation:* Training and retraining of an individual to the highest possible level of functional ability; It can be medical, vocational, social or psychological
  - Tertiary level of prevention signifies *'intervention in late pathogenesis phase'*

Also Remember

- All Vaccines (including Anti-rabies vaccine): *Specific Protection* mode of intervention, *Primary Level of prevention*
- Screening is predominantly Secondary Level of Prevention with some component of *Primary Prevention* also

81. Ans. (a) Primary *[Ref. Park 23/e p41]*

In the given question, risk factor (fluoride rich water) is already present in the environment and step is taken (defluoridation of water) to prevent occurrence of disease (Fluorosis): Thus it is an example of Primary level of prevention *(Mode of Intervention: Specific Protection)*

82. Ans. (c) Resting affected limbs in neutral position *[Ref. Essential Pediatrics O.P. Ghai, /e p212, Park 23/e p44]*

- Resting limbs in neutral position helps prevent overstretching of paralysed muscles, thereby limits further disability *'Disability Limitation'* relates to all levels of prevention whereas *'rehabilitation'* refers to taking individual to highest level of functional ability

Also Remember

- *Reducing occurrence of polio by immunization:* Primary Level of Prevention (Specific Protection)
- *Arranging for schooling of child suffering from PRPP:* Tertiary Level of Prevention (Vocational rehabilitation)
- *Providing calipers for walking:* Tertiary Level of Prevention (Medical Rehabilitation)

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83. Ans. (b) Prevention of emergence of development of risk factors *[Ref. Park 23/e p41]*

Also Remember

- *Action taken prior to the onset of disease:* Primary Prevention
- *Action taken to remove the possibility that a disease will ever occur:* Primary Prevention
- *Action which halts the progress of a disease:* Secondary Prevention

84. Ans. (d) Tertiary Prevention *[Ref. Park 23/e p42]*

Levels of prevention	Modes of intervention
Primary Level	Health Promotion and Specific Protection
Secondary Level	Early Diagnosis and Treatment
Tertiary Level	Disability Limitation and Rehabilitation

85. Ans. (b) Disease-Impairment-Disability-Handicap *[Ref. Park 23/e p44]*

- According to WHO definitions,
  - *Disease:* Any abnormal condition of an organism that impairs function
  - *Impairment:* Any loss or abnormality of psychological, physiological or anatomical structure or function
  - *Disability:* (Because of impairment,) any restriction or inability to perform an activity in a range considered normal for a human being
  - *Handicap:* A disadvantage for a given individual, resulting from an impairment/disability, that limits/prevents fulfillment of a role considered normal (depending on age, sex, social, cultural factors) for that individual.

Also Remember

- *Continuum of disease-handicap:*
  - Disease: Intrinsic pathology
  - Impairment: Anatomical and functional abnormality
  - Disability: Activity restriction
  - Handicap: Psychosocial disadvantage

86. Ans. (c) Secondary *[Ref. Park 23/e p42-43]*

87. Ans. (b) Disability *[Ref. Park 23/e p44]*

88. Ans. (b) High fiber diet *[Ref. Park 23/e p41-43]*

89. Ans. (c) Salt restriction *[Ref. Park 23/e p41]*

90. Ans. (a) Fluoridation; (b) Dental health education *[Ref. Park 23/e p41-43]*

- Most effective means to prevent dental caries: Use of fluoride

91. Ans. (a) Salt restriction in high risk area; (c) Preservation of traditional diet in low NCD area *[Ref. Park 23/e p41-43]*

92. Ans. (a) Marriage counselling; (e) Immunization *[Ref. Park 23/e p41-43]*

93. Ans. (b) Specific protection *[Ref. Park 23/e p43]*

94. Ans. (c) Secondary *[Ref. K. Park 23/e p42-43]*

95. (a) Breast self examination *[Ref. K. Park 23/e p41-43]*

96. Ans. (d) None *[Ref. K. Park 23/e p41]*

97. Ans. (a) 6 days *[Ref. K. Park 23/e p120, 283]*

98. Ans. (a) Primordial prevention *[Ref. K. Park 23/e p41]*

99. Ans. (a) Primary prevention *[Ref. K. Park 23/e p41-43]*

100. Ans. (a) Primary prevention *[Ref. K. Park 23/e p41-43]*

101. Ans. (b) Patients *[Ref. K. Park 23/e p42-43]*

102. Ans. (c) Secondary *[Ref. K. Park 23/e p42-43]*

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103. **Ans. (b) Primary prevention; (c) Specific protection** *[Ref. K. Park 23/e p41-43]*
104. **Ans. (a) Primordial prevention** *[Ref. K. Park 23/e p41]*
105. **Ans. (c) Secondary** *[Ref. K. Park 23/e p42-43]*
106. **Ans. (a) Pap smear** *[Ref. K. Park 23/e p41-43]*
107. **Ans. (c) Secondary** *[Ref. K. Park 23/e p42-43]*
108. **Ans. (a) Measles immunization** *[Ref. Park 23/e p41]*
109. **Ans. (a) 1 and 4** *[Ref. Park 23/e p41]*

Review Questions

110. **Ans. (b) Vaccination** *[Ref. Park 23/e p41-43]*
111. **Ans. (a) Primordial prevention** *[Ref. Park 23/e 41-43]*
112. **Ans. (a) Specific protection** *[Ref. Park 23/e p41-43]*
113. **Ans. (d) Chemoprophylaxis** *[Ref. Park 23/e p41-43]*
114. **Ans. (c) Rehabilitation** *[Ref. Park 23/e p42-44]*
115. **Ans. (c) Secondary prevention** *[Ref. Park 23/e p42-43]*
116. **Ans. (a) Pap smear for early detection of carcinoma cervix in community** *[Ref. Park 23/e p41-43]*
117. **Ans. (a) Health education** *[Ref. Park 23/e p41-43]*
118. **Ans. (a) Specific protection** *[Ref. Park 23/e p41-43]*
119. **Ans. (d) Immunization** *[Ref. Park 23/e p41-43]*
120. **Ans. (c) Provision of 3 doses of OPV in early infancy** *[Ref. Park 23/e p41-43]*
121. **Ans. (c) Specific protection** *[Ref. Park 23/e p41-43]*
122. **Ans. (b) Disease** *[Ref. Park 23/e p44]*
123. **Ans. (c) Early diagnosis and treatment** *[Ref. Park 23/e p43]*
124. **Ans. (a) Primordial** *[Ref. Park 23/e p41-43]*
125. **Ans. (b) Primary** *[Ref. Park 23/e p41-43]*
126. **Ans. (a) Primary** *[Ref. Park 23/e p41-43]*

ICD – 10

127. **Ans. (c) International Classification of Diseases, 10th revision** *[Ref. Park 23/e p49-50]*
Refer to Theory

Also Remember

- *ICF Classification (WHO):* International Classification of Functioning, Disability and Health

128. **Ans. (c) Arranged in 3 volumes** *[Ref. K. Park 23/e p49-50]*
129. **Ans. (c) 21** *[Ref. K. Park 23/e p49-50] [ICD-10 has 22 chapters; ICD-10-CM has 21 chapters]*

Review Questions

130. **Ans. (d) 10 years** *[Ref. Park 23/e p49-50]*
131. **Ans. (b) 10th revision has 15 major chapters** *[Ref. Park 23/e p39]*

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MISCELLANEOUS

132. Ans. (a) Apparent and Inapparent *[Ref. Park 23/e p39]*

Also Remember

- Iceberg Phenomenon of disease is also sometimes known as *'Biological spectrum of a disease'*
- *CLINICIAN'S FALLACY:* The iceberg phenomenon thwarts attempts to assess the burden of disease and the need for services, as well as the selection of representative cases for study; this leads to what has been called the 'clinician's fallacy' in which an inaccurate view of the nature and causes of a disease results from studying the minority of cases of the disease that are seen in clinical treatment

133. Ans. (b) Case fatality rate *[Ref. Park 23/e p58]*

134. Ans. (d) All of the above *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p305, Park 23/e p65]*

- *Periodic fluctuations:*
  - *Seasonal trends:*
    1. Is seasonal variation/fluctuation in occurrence of a disease
    2. Is due to vector variation, environmental factors and change in herd immunity
    3. Examples:
       i. Measles (early spring)
       ii. Upper respiratory infections (winters)
       iii. Gastrointestinal infections (summers)
  - *Cyclical trends:*
    1. Is occurrence of a disease in cycles spread over short periods of time, which may be days, weeks, months or years
    2. Examples:
       i. Measles (every 2-3 years)
       ii. Rubella (every 6-9 years)
       iii. Influenza pandemics (every 10-15 years)

135. Ans. (b) Individuals of a population *[Ref. Internet]*

- *Intraspecies/ Intraspecific competition:* Competition between individuals of a same species
- *Interspecies/Interspecific competition:* Competition between individuals of two different species.

136. Ans. (a) It is synonymous with isolation *[Ref. A Dictionary of Public Health, J. Kishore; p435, Park 23/e p120]*

Also Remember

- *Isolation versus quarantine:*

	Isolation	Quarantine
Separation of	Cases	Healthy contacts of cases
Done for	Cases themselves	Other persons around
Level of Prevention	Secondary (Treatment)	Primary (Specific Protection)
Duration	Till recovery (period of communicability)	Till maximum incubation period (6 days for Yellow Fever, IP = 2-6 days)

137. Ans. (c) 9:1000 *[Ref. Internet]*

138. Ans. (c) Explosive *[Ref. Park 23/e p64]*

- *Single exposure common vehicle outbreak:* Also known as *'Point Source Epidemic'*, where exposure to disease agent is brief and essentially simultaneous
  - Epidemic Curve rises and falls rapidly, with no secondary waves
  - Explosive: Clustering of cases within a narrow interval of time
  - All cases develop within one incubation period of disease

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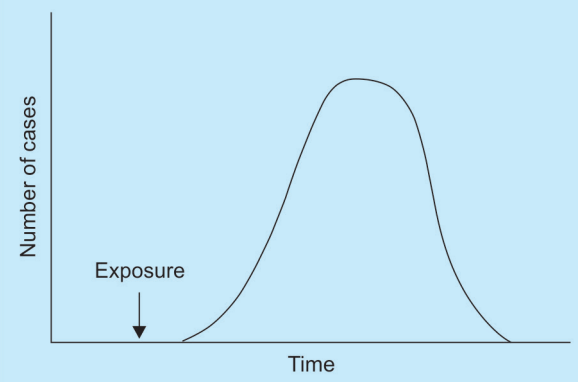

Figure: Epidemic curve

139. Ans. (d) Improving health care delivery *[Ref. Park 21/e p27, 831-32, Park 22/e p25, 835-836]*

MILLENNIUM DEVELOPMENT GOALS (MDGS - TO BE ACHIEVED BY 2015):

- Millennium Development Goals (MDGs) is a set of 8 Goals adopted by 189 countries at UN Millennium Summit in September 2000
- Baseline year was taken as 1990: 'All MDGs have to be achieved by 2015'
- 3 of 8 goals (Goal 4, 5, 6), 8 of 18 targets and 18 of 48 indicators are 'directly' health related
  - *Goal 1:* Eradicate extreme poverty and hunger
  - *Goal 2:* Achieve universal primary education
  - *Goal 3:* Promote gender equality and empower women
  - *Goal 4:* Reduce child mortality (Reduce by two-thirds the under-five mortality rate)
  - *Goal 5:* Improve maternal health (Reduce by three-quarters the maternal mortality ratio)
  - *Goal 6:* Combat HIV/AIDS, malaria and other diseases
  - *Goal 7:* Ensure environmental sustainability
  - *Goal 8:* Develop a global partnership for development

Also Remember

140. Ans. (b) 8th May 1980 *[Ref. Park 23/e p893]*

- *Last indigenous case of Small pox in India:* 17th May 1975
- *Last [importation] case of Small pox in India:* 24th May 1975
- *India declared Small pox-free:* July 1975
- *Last case of Small pox globally:* 26th October 1977 (Somalia)
- *Actual last case of small pox [Laboratory accident]:* 1978
- *Global eradication of Small pox:* 8th May 1980

141. Ans. (d) Age distribution *[Ref. K. Park 23/e p58]*

142. Ans. (a) Reduction of cardiovascular health hazards *[Ref. K. Park 23/e p27-28]*

143. Ans. (b) Occurs in one incubation period *[Ref. K. Park 23/e p64]*

144. Ans. (a) Point source epidemic *[Ref. K. Park 23/e p64]*

145. Ans. (a) Reduce by 2/3rd the under five mortality by year 1990-2015 *[Ref. K. Park 23/e p27-28]*

146. Ans. (a) 3/4 *[Ref. K. Park 23/e p27-28]*

147. Ans. (c) Secular trends *[Ref. K. Park 23/e p66]*

148. Ans. (b) Duration more than one incubation period *[Ref. K. Park 23/e p64-65]*

149. Ans. (a) Variations in herd immunity *[Ref. K. Park 23/e p65]*

150. Ans. (c) Propagated epidemic *[Ref. Park 23/e p65]*

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151. Ans. (a) Secular *[Ref. park 23/e p66]*

LONG TERM FLUCTUATIONS (SECULAR TRENDS)

- Changes in occurrence of a disease (progressive increase or decrease) over a long period of time, generally several years or decades
- Is the consistent tendency to change in a particular direction or a definite movement in one direction

Review Questions

152. Ans. (a) Scrutiny of factors *[Ref. Park 23/e p40]*

153. Ans. (c) Sentinel surveillance *[Ref. Park 23/e p40]*

154. Ans. (c) PEM *[Ref. Park 23/e p39]*

155. Ans. (a) For longest incubation period of disease *[Ref. Park 23/e p120]*

156. Ans. (a) Immediate cause, and the direct underlying cause which started the whole trend of events leading to death *[Ref. Park 23/e p56]*

157. Ans. (c) 21 days *[Ref. Park 23/e p840]*

158. Ans. (d) 21 days *[Ref. Internet, Park 23/e p840]*

159. Ans. (c) Whooping cough *[Ref. Park 23/e p163]*

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CHAPTER

3 Epidemiology and Vaccines

Definition and Epidemiological Methods

Types of Epidemiological Studies

- *Types of epidemiological studies*:

Type of epidemiological study	Unit of study[Q]
1. Observational studies[Q]	
a. Descriptive studies *(Hypothesis formulation[Q])*	
b. Analytical studies *(Hypothesis testing[Q])*	
i. Cohort study	Individual
ii. Case control study	Individual
iii. Cross sectional study	Individual
iv. Ecological study	Population[Q]
2. Experimental studies *(Hypothesis confirmation)[Q]*	
a. Randomized controlled trial	Patients[Q]
b. Field trial	Healthy people
c. Community trial	Community
d. Clinical trial	Patients

- *Synonyms of names of epidemiological studies*[Q]:

Type of epidemiological study	Unit of study[Q]
Cohort study Prospective study Forward looking study Cause to effect study Risk factor to disease study Exposure to outcome study Follow-up study Incidence study	**Case control study** Retrospective study Backward looking study Effect to cause study Disease to risk factor study Outcome to exposure study TROHOC study
Cross-sectional study *Prevalence study* *SNAPSHOT of population study*	**Ecological study** Correlational study

I Evidence Based Medicine/ Practice
Is considered 'Gold standard for clinical practice

Evidence Based Medicine/ Practice

- Is considered 'Gold standard for clinical practice[Q]'
- Aims to apply best available evidence gained from scientific method to clinical decision making
- *Highest importance is given to strongest epidemiological studies*:
  - *Most important*: Meta-analyses, Systematic reviews, Blinded trials
  - *Least importance*: Opinions and conventional wisdom of researchers and experts
- *Statistical parameters used*:
  - Likelihood ratios
  - Receiver operator characteristic curve

I Highest importance is given to Meta-analyses

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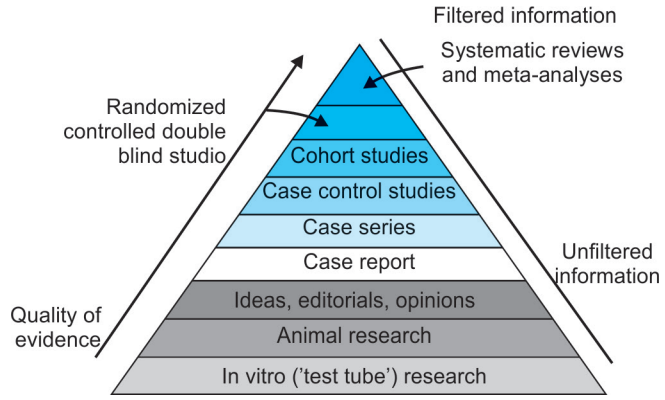
Evidence-Pyramid in Research [From top to bottom]Q

- Meta-analysis (Highest clinical relevance: GOLD STANDARDQ)
- Systematic review
- Cohort study
- Case control study
- Case series
- Case reportQ
- Ideas, Editorials, OpinionsQ
- Animal research
- In-vitro (test-tube) research (Lowest clinical relevanceQ)

I In-vitro (test-tube) research (Lowest clinical relevance)



MEASUREMENTS IN EPIDEMIOLOGY

Tools of Measurement in Epidemiology

- *Rate*: Numerator (a) is a part of denominator (b) and multiplier is 1000 or 10,000 or 100,000 or so on…
- *Ratio*: Numerator (a) is not a part of denominator (b) and BOTH numerator and denominator are unrelated
- *Proportion*: Numerator (a) is a part of denominator (b) and multiplier is 100
  Proportion is always expressed in percentage (%)

Examples of Tools of Measurement in Epidemiology

Parameter	Formula	Numerator (N) & Denominator (D)	Conclusion
Infant mortality rate (IMR)	$\frac{\text{No. of infant deaths}}{\text{No. of Live births}} \times 1000$	N is a part of D; multiplier NOT 100	Rate
Maternal mortality ratio (MMR)Q	$\frac{\text{No. of maternal deaths}}{\text{No. of Live births}} \times 100000$	N is NOT a part of D; both unrelated	Ratio
Sex ratio (SR)	$\frac{\text{No. of females}}{\text{No. of males}} \times 1000$	N is NOT a part of D; both unrelated	Ratio
IncidenceQ	$\frac{\text{No. of new case}}{\text{Total population at risk}} \times 1000$	N is a part of D; multiplier NOT 100	Rate
PrevalenceQ	$\frac{\text{No. of new + old cases}}{\text{Total population}} \times 100$	N is a part of D; multiplier 100	Proportion
Case fatality rateQ (CFR)	$\frac{\text{No. of deaths}}{\text{No. of cases}} \times 100$	N is a part of D; multiplier 100	Proportion
Relative risk (RRQ)	$\frac{\text{Incidence among exposed}}{\text{Incidence among non-exposed}}$	N is NOT a part of D; both unrelated	Ratio

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Indicators of Health

- *Mortality indicators*[Q]:
  - Crude death rate (CDR)
  - Life expectancy (LE[Q])
  - Infant mortality rate (IMR)
  - Child mortality rate (CMR)
  - Under 5 proportional mortality rate (U5MR)
  - Maternal mortality rate (MMR)
  - Disease specific mortality
  - Proportional mortality rate
- *Morbidity indicators*[Q]:
  - Incidence and prevalence
  - Notification rates
  - Attendance rates at OPD, health centres
  - Admission, re-admission and discharge rates
  - Duration of stay in hospital
  - Spells of sickness or absence from work/school
- *Disability rates*:

Event type indicators[Q]	Person type indicators[Q]
No. of days of restricted activity Bed disability days Work-loss days	*Limitation of mobility*: Confined to bed/ house Special aid in getting around *Limitation of activity*: Limitation to perform ADL Limitation in major activity

- *Nutritional status indicators*:
  - Anthropometric measurements of preschool children
  - Heights of children at school entry
  - Prevalence of Low birth weight
- *Health care delivery indicators*[Q]:
  - Doctor – population ratio
  - Doctor – nurse ratio
  - Population – bed ratio
  - Population per health centre
  - Population per traditional birth attendant
- *Utilization rates*[Q]:
  - Proportion of infants fully immunized against 6 EPI diseases
  - Proportion of pregnant women who receive antenatal care
  - Percentage of population using various methods of family planning
  - Bed-occupancy rate
  - Average length of stay in a hospital
  - Bed turn over ratio
- *Indicators of social and mental health*: Suicide/ homicide/ acts of violence/ road traffic accidents/ alcohol or tobacco use rates
- *Environmental indicators*: Air or water pollution indicators, Proportion of population having access to safe water supply and sanitation
- *Socio-economic indicators*: Per capita GNP, Level of unemployment, Dependency ratio, Literacy rates
- *Health policy indicators*: Proportion of GNP spent on health services, Proportion of GNP spent on health related activities
- *Indicators for quality of life*: Physical quality of life index (PQLI)
- *Other indicators*: Social indicators, HFA indicators, MDGs indicators

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INTERNATIONAL DEATH CERTIFICATE (IDC)

WHO Recommended Death Certificate (For International Use: IDC)

- *Consist of four lines*:
  - *Line Ia:* Disease or condition directly leading to death
  - *Line Ib:* Antecedent/ underlying cause
  - *Line Ic:* MAIN ANTECEDENT/ UNDERLYING CAUSE[Q]
  - *Line II:* Other significant conditions contributing to death BUT not related to disease/ condition causing it
- *Example of a death certificate:*
  - *Line Ia:* Renal failure
  - *Line Ib:* Diabetic nephropathy
  - *Line Ic:* DIABETES MELLITUS
  - *Line II*: Hypertension
- *Concept of underlying cause*: Line Ic is the MOST IMPORTANT line in death certificate, thus also known as *'Essence of Death Certificate[Q]'*

I Death Certificate
Consist of four lines

I Line Ic: Main Underlying Cause

I Line Ic is
'Essence of Death Certificate[Q]'

MORTALITY MEASUREMENTS

Crude Death Rate (CDR) [& Crude Birth Rate CBR]

- *Crude birth rate (CBR)*: Annual number of live births per 1000 mid-year population

$$CBR = \frac{\text{No. of births in an area in a year}}{\text{Total Mid-year population}^{Q}} \times 1000$$

- *Crude death rate (CDR)*: Annual number of deaths per 1000 mid-year population

$$CDR = \frac{\text{No. of deaths in an area in a year}}{\text{Total Mid-year population}^{Q}} \times 1000$$

- *Findings of SRS Bulletin*: [September 2013]
  - Crude Birth Rate (CBR): 21.6 per 1000 mid-year population
  - Crude Death Rate (CDR): 7.0 per 1000 mid-year population

I *Crude death rate (CDR):*
Annual number of deaths per 1000 mid-year population

Specific Death Rate (SDR)

- May be cause/disease-specific or group specific (age-specific, sex-specific, age-sex specific)
- Help identify particular 'at risk' group(s) for preventive action
- Permit comparison between different causes within same population

$$SDR = \frac{\text{No. of deaths from a specific cause in a year}}{\text{Mid-year population}} \times 100$$

Proportional Mortality Rate (PMR)

- PMR is number of deaths due to a particular cause (or in a specific age group) per 100 (or 1000) total deaths
- *Advantages of PMR*:
  - Is 'simplest measure of estimating the burden of a disease' in the community[Q]
  - *Is a useful health status indicator*: Indicates magnitude of preventable mortality
  - Is used when population data is not available
- *Disadvantages of PMR*:
  - Is of limited value in making comparisons between population groups or different time periods
  - Does not indicate the risk of members of population contracting or dying from the disease

I *PMR*
Is 'simplest measure of estimating the burden of a disease'

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Case Fatality Rate (CFR)

- CFR represents *'killing power of a disease'*
  - It is *'closely related to virulence of organism*[Q]*'*
- *CFR is a Proportion*: Always expressed in percentage
- CFR is the *'complement of Survival Rate'*
  - CFR = 1 – Survival Rate
- *Limitations of CFR*:
  - *Time interval is not specified*[Q]
  - Usefulness of CFR is limited for chronic diseases

$$\text{CFR} = \frac{\text{Total no. of deaths due to a disease}}{\text{Total no. of cases due to a disease}} \times 100$$

I CFR = 1 – Survival Rate

Survival Rate (SR)

- *Survival rate*: Is the proportion of survivors in a group (e.g. of patients), studied and followed over a period of time (e.g. over a period of 5 years)
- Is used to *'describe prognosis'* in certain disease conditions
- Quite useful in cancer studies
- Can be used as a *'yardstick for the assessment of standards of therapy'*
- Survival period is usually reckoned from date of diagnosis or start of treatment[Q]

$$\text{SR} = \frac{\text{Total no. of patients alive after 5 years}}{\text{Total no. of patients diagnosed/treated}} \times 100$$

Standardization of Death Rates

- *Adjusted or standardized rates*:
  - While comparison of death rates of two populations, '*crude death rate is not the right yardstick*', as age-compositions are different[Q]
  - Age-adjustment or age-standardization removes confounding effect of different age structures
  - Standardization may be direct or indirect
  - Standardization is carried out beginning by using a *'Standard Population'*
- *Standard population*: Is a population where numbers in each age and sex group are known
  - *Two frequently used standard populations are*:
    - Segi world population
    - European standard population
  - *Choice of standard population is arbitrary*:[Q]
    - Available standard populations may be used
    - Standard population may also be created using 2 populations
    - National population need not always be taken as Standard population
    - Is commonly used in occupational studies: Comparison of mortality in an industry and general population
    - Can be used for occurrence of disease (rather than death)

I National population need not always be taken as Standard population

Types of Standardized Death Rates

- *Direct standardization*:
  - *Method*:
    - Age-specific rates of the population (whose crude death rate is to be standardized) is *applied on a standard population*
    - Total expected deaths calculated
    - Total expected deaths divided by total standard population to yield standardized death rate
  - *Feasibility*:
    - Availability of age-specific death rates (ASDR[Q])
    - Availability of population in each age group

I *Direct standardization: Feasibility:* Availability of age-specific death rates (ASDR[Q])

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- *Indirect standardization*: *Standardized mortality ratio (SMR)*: Is simplest and most useful form
  - *Method:* Calculate expected deaths, assuming that study group experiences the death rates of a standard population
  - *Feasibility:* Permits adjustment where age-specific rates are not available or are unstable because of small numbers
  - *Examples of indirect Standardization*Q:
    - *Standardized mortality ratio (SMR)*Q:

      SMR = Observed deaths/ Expected deaths × 100

    - Life Table Analysis
    - Survival Analysis
    - Regression Analysis
  - Multivariate Analysis

	Direct Standardization	Indirect Standardization
Method	Use actual ASDRs* on the standard age structure	Use standard ASDRs* on the actual age structures
No. of deaths in each age group *Population in each age group*	Both are available	Both are unavailable

(ASDR* = Age Specific Death Rates)

MORBIDITY MEASUREMENTS

Incidence

- *Incidence*: Is defined as the *'no. of new cases'* occurring in a defined population during a specified period of time
- *For a given period,*

$$\text{Incidence} = \frac{\text{No. of new cases of a disease in a year}}{\text{Total population at risk}} \times 1000$$

  - *Incidence is a RATE*, expressed per 1000
- *Special types of incidence rates*:
  - *Attack rate*Q: Incidence rate used when population is exposed for a small interval of time, e.g. epidemic
  - *Secondary Attack Rate (SAR)*: Is no. of exposed persons developing the disease within range of incubation period, following exposure to the primary case
- Incidence is the best measure of disease frequency in etiological studies
  - *Incidence can be determined from*: Cohort studyQ

I *Incidence can be determined from:* Cohort study

I PREVALENCE IS A PROPORTION

Prevalence

- *Prevalence*: Is total current (Old + New) cases in a given population over a point or period of time
- *Types of prevalence*:
  - a point of time (*Point Prevalence*)
  - a period of time (*Period Prevalence*)

$$\text{Prevalence} = \frac{\text{No. of total (new + old) cases of a disease in a year}}{\text{Total population}} \times 100$$

  - PREVALENCE IS A PROPORTION (Prevalence IS NOT A RATIO): Numerator is a part of denominator, and is always expressed in percentageQ
- *Prevalence can be determined from*: Cross Sectional StudyQ

I *Prevalence can be determined from:* Cross Sectional Study

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- *Relationship between Incidence and Prevalence*: ***Given the assumption*** that population is stable AND incidence & duration are unchanging[Q],

  Prevalence = Incidence × Mean duration of the disease P = I × d

  - Prevalence describes balance between incidence, mortality and recovery
  - Incidence reflects causal factors
  - Duration reflects the prognostic factors

I
P = I × d

DESCRIPTIVE EPIDEMIOLOGY

Time Distribution of Disease

Please Refer to Chapter 2

Types of Epidemics

- *Single exposure or 'Point source' epidemics*:
  - 'Sharp rise and sharp fall' in no. of cases[Q]
  - 'Clustering of cases' in a narrow interval of time[Q]
  - All 'cases develop within one incubation period' of the disease[Q]
  - Examples: Food poisoning, Measles, Chicken pox, Cholera, BHOPAL GAS TRAGEDY
- *'Common source', continuous or repeated exposure epidemics:*
  - 'Sharp rise' in no. of cases
  - Fall in no. of cases is interrupted by 'Secondary waves/ peaks'[Q]
  - Examples: Contaminated well in a village, nationally distributed brand vaccine or food, prostitute in a gonorrhoea outbreak, LEGIONNAIRE'S DISEASE outbreak in Philadelphia (1976)
- *Propagated epidemics:*
  - *'Gradual rise and gradual fall'* over a long time (Tail off)
  - Results from *'person-to-person transmission[Q]'*
  - Transmission continues till no. of susceptibles is depleted or susceptibles are no longer exposed to infected individuals
  - Speed of spread depends upon herd immunity, secondary attack rate, opportunities for contact
  - Examples: HIV, tuberculosis

I
Single exposure or 'Point source' epidemics:
All 'cases develop within one incubation period'

I
Continuous or repeated exposure epidemics:
'Secondary waves/ peaks'

I
Propagated epidemics:
Results from *'person-to-person transmission'*

Endemic

- *Endemic:* Constant presence of a disease or infectious agent in a defined geographical area
  - Is the 'usual or expected frequency' of a disease in a population[Q]
- *Types of Endemic:*
  - *Hyper-endemic:* Constant presence of a disease or infectious agent at high incidence/prevalence AND affects all age groups equally
  - *Holo-endemic:* A high level of infection beginning early in life AND affecting most of the children population

I
Endemic:
Is the 'usual or expected frequency' of a disease in a population

Pandemic

- *Pandemic*: An epidemic usually affecting a large proportion of the population, occurring over a large geographical area such as part of a nation, nation, continent or world (Country-to-country spread)

Sporadic

- *Sporadic*: Cases which are *'scattered about[Q]'*
  - Cases are widely separated in space and time
  - Show little or no connection with each other
  - There is no recognizable source of infection

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ANALYTICAL EPIDEMIOLOGY

Exposure & Outcome in Analytical Studies[Q]

	Exposure	Outcome	Remarks	Direction
Prospective cohort study	Occurred	Followed-up	Start with exposure	Forward looking
Retrospective cohort study	Occurred	Occurred	Start with exposure	Forward looking
Mixed cohort study	Occurred	Occurred; further assessed in future	Start with exposure	Forward looking
Case control study	Occurred	Occurred	Start with outcome	Backward looking
Cross sectional study	Occurred	Occurred	Both exposure and outcome assessed at a point of time	Neither forward looking nor backward looking

- *In a Prospective cohort study, Outcome has not yet occurred when the study has begun*: Only exposure has occurred; we look for development of same disease in both exposed and non-exposed groups
- *In a Retrospective cohort study, both exposure as well as outcome have occurred when the study has begun*: First we go back in time and take only exposure into consideration (cohorts identified from past hospital/ college records), then look for development of same disease in both exposed and non-exposed groups
- *In a Combined prospective-retrospective cohort study, both exposure as well as outcome have occurred when the study has begun*: First we go back in time and take only exposure into consideration (cohorts identified from past hospital/ college records), then look for development of same disease in both exposed and non-exposed groups; later cohort is followed prospectively into future for outcome
- *In a Case control study, both exposure as well as outcome have occurred when the study has begun*: First we take outcome into consideration, and then go back in time taking exposure into consideration; then compare exposure in both diseased (cases) and non-diseased (controls)
- *In a nested case control study*, only exposure has occurred when the study begins; when the disease develops in a population, then 2 groups of cases (diseased) and controls (non-diseased) are formed and their exposure status is compared
- *In a case-series study, both exposure as well as outcome have occurred when the study has begun*: First we take outcome into consideration, and then go back in time taking exposure into consideration; there is NO COMPARISON with non-diseased (controls)
- *In a prevalence survey (cross-sectional study),* exposure as well as outcome may co-exist at the time of study (there is no longitudinal direction)

Cohort Study

- Is a type of analytical (observational) study used for 'hypothesis testing'
- *Is known by several synonyms*[Q]:
  - Prospective study
  - Forward looking study
  - Cause to effect study
  - Exposure to outcome study
  - Risk factor to disease study
  - *Incidence study*
  - Follow up study
- *Types of cohort studies*:
  - *Prospective cohort study*[Q]:
    - Known as *'Current cohort study'* or *'Concurrent cohort study'*

I

Cohort Study
Is a type of analytical (observational) study used for 'hypothesis testing'

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- *Outcome has not yet occurred when the study has begun*: Only exposure has occurred; we look for development of same disease in both exposed and non-exposed groups
- Examples:
  1. Framingham heart study
  2. Doll & Hills prospective study on smoking and lung cancer

– *Retrospective cohort study*[Q]:
- Known as 'Historical cohort study' or 'Non-concurrent cohort study'
- Combines advantages of both Cohort study and Case control study
- Both exposure as well as outcome have occurred when the study has begun: First we go back in time and take only exposure into consideration (cohorts identified from past hospital/college records), then look for development of same disease in both exposed and non-exposed groups
- *Sample size required is same as that of prospective cohort study*
- Examples:
  1. Effect of fetal monitoring on neonatal deaths
  2. PVC exposure and angiosarcoma of liver

– *Combined prospective-retrospective cohort study*[Q]:
- Known as *'Mixed cohort study'*
- Combines designs of both prospective cohort study and retrospective cohort study
- *Both exposure as well as outcome have occurred when the study has begun*: First we go back in time and take only exposure into consideration (cohorts identified from past hospital/ college records), then look for development of same disease in both exposed and non-exposed groups; later cohort is followed prospectively into future for outcome
- Examples: Court-Brown & Doll study on effects of radiation therapy

I Strength of association in a cohort study is
Relative risk (RR)
Attributable risk (AR)
Population attributable risk (PAR)

Strength of Association in Cohort Study

- Strength of association in a cohort study is evaluated by[Q]:
  – Relative risk (RR)
  – Attributable risk (AR)
  – Population attributable risk (PAR)
- *Relative risk (RR)* = Incidence among exposed/Incidence among non-exposed[Q]
  RR = Iexposed/Inon-exposed
  – *Interpretation of RR*[Q]: Incidence of lung disease among exposed IS SO MANY TIMES HIGHER as compared to that among non-exposed

I RR = Iexposed/Inon-exposed

- *Attributable risk (AR)* = (Incidence among exposed – Incidence among non-exposed)/Incidence among exposed × 100
  AR = (Iexposed – Inon-exposed)/Iexposed × 100
  – *Interpretation of ARQ:* So much disease can be attributed to exposure
- *Population attributable risk (PAR)* = (Incidence among total – Incidence among non-exposed)/Incidence among total × 100
  PAR = (Itotal – Inon-exposed)/Itot × 100
  – *Interpretation of PAR*[Q]: If risk factor is modified or eliminated, there will be so much annual reduction in incidence of disease in the given population

Interpretation of Relative Risk (RR)

RR	Interpretation[Q]		Example	
			Risk Factor	***Disease***
RR > 1	$I_{exp} > I_{nonexp}$	So many times chances/incidence of disease development is more among exposed as compared to non-exposed **(Positive Association)**	Smoking	Lung Cancer

I RR = 1
(No Association)

Contd...

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Contd...

RR = 1	$I_{exp} = I_{nonexp}$	Chances/incidence of disease development is same among exposed as compared to non-exposed **(No Association)**	Smoking	HIV/AIDS
RR < 1	$I_{exp} < I_{nonexp}$	Chances/incidence of disease development is less among exposed as compared to non-exposed **(Negative Association)**	Vitamin-A intake	Epithelial cancers

I
Framingham Heart Study
Is a classical example of cohort study

Framingham Heart Study[Q]

- *Is a classical example of cohort study*
  - Initiated in 1948 by US Public Health Service at Framingham, a town in Massachusetts, USA
- *Aim*: To study the relationship of risk factors (serum cholesterol, blood pressure, weight, smoking) to the subsequent development of cardiovascular diseases
  - *Age group*: 30 – 62 years
  - *Sample size*: 5127 (4469 – 69% of the sample actually underwent first examination)
- *Method*: Multiple exposure were studied, as well as complex interactions among the exposures using multivariate techniques
  - *Follow-up*:
    - Study population was examined every 2 years for 20 years
    - Daily surveillance of hospitalizations at only hospital at Framingham
- *Findings of study*:
  - Increasing risk of CHD with increasing age & more seen in males
  - Hypertensive have a greater risk of CHD
  - Elevated blood cholesterol level is associated with CHD
  - Tobacco smoking and habitual use of alcohol increase risk of CHD
  - Increased physical activity decrease CHD development
  - Increase in body weight is associated predisposes to CHD
  - Diabetes mellitus increases risk of CHD

Cohort Studies Versus Case Control Studies[Q]

	Cohort Studies	Case Control Studies
Before start	Only exposure has occurred	Both exposure as well as outcome have occurred
Synonyms	Prospective study Forward looking study Cause to effect study Exposure to outcome study Risk factor to disease study Incidence study Follow up study	Retrospective study Backward looking study Effect to cause to study Outcome to exposure study Disease to risk factor study TROHOC study
Advantages[Q]	Provides Incidence, Relative risk Allows study of several etiological factors simultaneously No Recall bias	Easy to carry out Rapid & Inexpensive No risk to subjects Minimal ethical problems No loss to follow up/ Attrition *'Particularly suitable to investigate rare diseases'*
Disadvantages[Q]	Ethical problems Loss to follow up (attrition) Time consuming Expensive Not suitable to investigate rare diseases	Selection of an appropriate control group may be difficult Cannot measure incidence: can only estimate Odds ratio Recall bias
Strength of association	Relative risk AR PAR	Odds ratio

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Controls in a Case Control Study

- In a case control study, selection of controls is a prerequisite
- If the study group is small, choose up to 4 controls per case (In larger studies with equal cost to collect cases and controls 1 : 1 is sufficient[Q])
- Cases are diseased individuals, Controls are those free from the disease under study
- Controls must be similar to cases, as much as possible except for the absence of disease under study
- *Sources of controls*[Q]:
  - Hospital controls: are often a 'source of selection bias'
  - Neighbourhood controls: provide similar socio-economic and living conditions
  - Relatives: Sibling controls are unsuitable in genetic studies[Q]
  - General population: by choosing a random sample
  - Best friends controls

I Sibling controls are unsuitable in genetic studies

Strength of Association in a Case Control Study

- *Strength of association in a case control study*[Q]: Case Control Study cannot provide with incidences, so Relative Risk cannot be calculated; so in a Case Control Study, we calculate *'an estimate of Relative Risk'*, known as *'Odds Ratio'* (CROSS PRODUCT RATIO)
- *CORRECT TABLE CONSTRUCTION in a case control study*: Table will have disease at the top (row) and history of exposure/ risk factor on the left (column)
- *Odds Ratio In a 2 × 2 table for a case control study*:

	Disease Present (cases)	Disease Absent (controls)
Exposure present	a	b
Exposure absent	c	d

Odds Ratio (Cross Product Ratio) = ad/bc

I *Strength of association in a case control study*[Q]: 'Odds Ratio'

I Odds Ratio (Cross Product Ratio) = ad/bc

Relative Risk (RR) Versus Odds Ratio (OR)[Q]

	Relative risk (RR)	Odds ratio (OR)
Synonyms	Risk ratio	Cross product ratio
Utility	Estimates strength of association in a cohort study	Estimates strength of association in a case control study
Measure of strength of association	More accurate estimate	Less accurate (only an estimate of RR)
Calculation	exposed/non-exposed	ad/ bc

Cross Sectional Study

- Is based on the single examination of a cross-section of a population *'at one point of time'*, results of sample are then projected to whole population
- Is simplest form of observational epidemiological study[Q]
- *Advantages*:
  - Provides *'Prevalence of the disease'* under study[Q]
  - Gives *'Snapshot of a population'*
  - More useful for chronic diseases
- *Disadvantages*:
  - Tells about distribution of a disease, *'rather than its etiology'*
  - Cannot establish causality as *'does not establish time sequence[Q]'*
  - Provides little information about natural history of disease or incidence

I Cross Sectional Study Provides *'Prevalence of the disease'*

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Ecological Study (Correlational Study)

- Type of analytical (observational) epidemiological study which provide the *'least satisfactory type of evidence on causality'*
- *Is the least preferable observational/ analytical study design*[Q]
- *Units of study*: Population[Q]
- *Done in a small time frame*: Inexpensive; use data that is already available
- *Advantage*: Data can be used from populations with different characteristics
- *Disadvantages*:
  - *Potential problem*: Socio-economic confounding
  - *Ecological fallacy*[Q]: Is an error of interpretation of statistical data in an ecological study, whereby characteristics are ascribed to a group of individuals which they may not possess as individuals

I Ecological Study
Units of study:
Population

I *Preference of epidemiological studies for establishing causality*[Q]:
1st preference: Meta-analysis

Utilities of Epidemiological Studies

- *Preference of epidemiological studies for establishing causality*[Q]:
  - *1st preference*: Meta-analysis
  - *2nd preference*: Randomised controlled trials (RCTs)
  - *3rd preference*: Retrospective (Non-concurrent/ Historical) cohort study
  - 4th preference: Prospective cohort study (Concurrent cohort study)
  - 5th preference: Case control study
  - 6th preference: Cross-sectional study
  - 7th preference: Ecological study
- *Useful Parameter(s) obtained by epidemiological studies*[Q]:

Epidemiological studies	Useful parameter(s) obtained
Cohort study	Incidence, Relative risk, Attributable risk (AR), Population AR
Case control study	Odds ratio
Cross sectional study	Prevalence
Ecological study	Group characteristics

- *Abilities of epidemiological studies to prove causation*[Q]:

Type of study	Ability to prove causation
Randomised controlled trial	Strong
Cohort study	Moderate
Case control study	Moderate
Cross sectional study	Weak
Ecological study	Weak

- *Applications of various study designs*[Q]:

Application	**Utility of study**			
	Cohort	Case-control	Cross-sectional	Ecological
Investigation of rare disease	–	+++++	–	++++
Investigation of rare cause	+++++	–	–	++
Testing multiple effects	+++++	–	++	+
Study of multiple exposure	+++	++++	++	++
Measurement of time relationship	+++++	+	–	++
Direct incidence measurement	+++++	+	–	–
Investigation of long latent periods	+	+++	–	–

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Potential Errors in Epidemiological Studies

- *Random errors*: SAMPLING ERRORS
  - Is *'divergence due to chance alone'* of an observation on a sample from true population value, leading to *'lack of precision'* in measurement
  - Random error *'cannot be completely eliminated'*
  - *Random errors can be reduced by*: careful measurement of exposure and outcome, thus making individual measurements precise
  - *Best way of reducing sampling errors (increasing precision)*: Increase the sample size in the study
- *Systematic errors*: BIASES
  - Occur whenever there is a tendency to produce results that differ in systematic manner from the true values
  - Bias is any *'systematic error'* in an epidemiological study, occurring during data collection, compilation, analysis and interpretation

I Bias is any *'systematic error'* in an epidemiological study

Bias

- *Bias*: Is any 'systematic error' in an epidemiological study, occurring during data collection, compilation, analysis and interpretation[Q]
- *Predominantly biases are of 3 types*:
  - *Subject bias*: Error introduced by study subjects. Examples:
    - Hawthorne effect[Q]
    - Recall bias[Q]
  - *Investigator bias*: Error introduced by investigator
    - Selection bias[Q]
  - *Analyzer bias*: Error introduced by analyzer

Some Important Types of Biases in Epidemiological Studies

- *Apprehension bias*: Certain levels (pulse, blood pressure) may alter systematically from their usual levels when the subject is apprehensive
- *Attention bias (Hawthorne effect)*: Study subjects may systematically alter their behaviour when they know they are being observed[Q]
- *Berksonian bias (Admission rate bias)*: Bias due to hospital cases and controls being systematically different from each other[Q]
- *Interviewer bias*: Interviewer devotes more time of interview with cases as compared to controls[Q]
- *Lead time bias (Zero time shift bias)*: Bias of over-estimation of survival time, due to backward shift in starting point, as by screening procedures[Q]
- *Memory/ Recall bias*: Cases are more likely to remember exposure more correctly than controls[Q]
- *Neyman bias (Prevalence-incidence bias)*: Bias due to missing of fatal cases, mild/ silent cases and cases of short duration of episodes from the study[Q]
- *Selection bias (Susceptibility bias)*: Groups to be compared are differentially susceptible to the outcome of interest, even before the experimental maneuver is performed[Q]

I *Berksonian bias (Admission rate bias)*: Bias due to hospital cases and controls being systematically different from each other

I *Selection bias (Susceptibility bias)*: Groups to be compared are differentially susceptible to the outcome of interest, even before the experimental maneuver is performed

Minimization of Biases in Epidemiological Studies

- *Blinding*:

Type	Method[Q]	Minimizes[Q]
Single blinding	Study subjects are not aware of the treatment they are receiving	Subject bias
Double blinding	Study subjects as well as investigator are not aware of the treatment study subjects are receiving	Subject bias + Investigator bias
Triple blinding	Study subjects, investigator as well as analyzer are not aware of the treatment study subjects are receiving	Subject bias + Investigator bias + Analyzer bias

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Confounding

- *Confounding*: Any factor associated with both exposure and outcome, and has an independent effect in causation of outcome is a confounder[Q]
  - It is found unequally distributed between the study and control groups
  - Is associated with both exposure and outcome
  - Has an independent effect in causation of outcome (thus is a risk factor itself)

Confounding: Any factor associated with both exposure and outcome, and has an independent effect in causation of outcome is a confounder

Methods Used to Control Confounding

Method	Utility to control confounding[Q]
Randomization	*Most ideal method*[Q]
Restriction	Limiting study to people who have particular characteristics
Matching	Mostly useful in case control studies
Stratification	Useful for larger studies
Statistical modeling	When many confounding variables exist simultaneously

Methods Used to Control Confounding
Randomization is the Most ideal method

Matching

- *Matching*: Process of selecting controls in a such a way that they are similar to cases (with regard to certain pertinent selected variables which may influence the outcome of disease, thereby distorting the results)
  - *Matching eliminates confounding*: Matching distributes known confounding factors equally in two groups[Q]
- *Types of matching*:
  - *Caliper matching*: Process of matching comparison group subjects to study group subjects within a specified distance for a continuous variable (matching age to within 2 years)
  - *Frequency matching*: Frequency distributions of matched variable(s) are similar in study and comparison groups
  - *Category matching*: Process of matching study and control group subjects in broad classes (e.g. occupational groups)
  - *Individual matching*: Relies on identifying individual subjects for comparison, each resembling a study subject for matched variable(s)
  - *Pair matching*: Individual matching in which study & comparison subjects are paired

Randomization is Superior to BOTH Matching and Blinding

	Blinding	Matching	Randomization
Removes	Bias	Known confounding	Selection bias Known confounding Unknown confounding
Types	Single blinding Double blinding Triple blinding	Caliper matching Frequency matching Category matching Individual matching Pair matching	Random number tables Computer software Currency notes Lottery method

Nested Case Control Study

- Is a hybrid design where *'a case control study is nested in a cohort study'*
- *Is predominantly a type of Cohort study* (due to forward direction)[Q]

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- Usefulness limited for studies involving *'rare diseases AND whose diagnostic tests are very expensive'*
- *Study design*:
  - A population is identified and baseline data is obtained from interviews, blood or urine tests, etc.
  - Population is then followed up for a period of time (Cohort study) for development for the disease under study
  - A Case control study is then carried out:
    - *Cases:* people who developed the disease
    - *Controls:* Sample from those who did not develop the disease
    - Samples/ history collected at baseline are then examined
- *Advantages*:
  - *Elimination of problem of Recall bias*: Interviews are performed at the beginning of the study (at baseline), and data are obtained before the disease has developed
  - *Maintenance of temporal association*Q: If any disease or abnormality in a biological characteristic is noted, it is more likely that it represent risk factors or other pre-morbid characteristics rather than a manifestation of early, subclinical disease
  - *Economical to conduct*: Expensive tests need not be conducted on entire population; only carried out among cases and controls

I Nested Case Control Study
Is predominantly a type of Cohort study

EXPERIMENTAL EPIDEMIOLOGY

Randomised Controlled Trials (RCTs)

- *Unit of study in RCT*: PatientQ
- *RCT is of two types*:
  - *Concurrent parallel design*: Comparisons are made between 2 groups:
    - *Experimental group*: Is exposed to specific medication or intervention
    - *Reference group*: Is not exposed to specific medication or intervention
  - *Crossover design*: Comparisons are made between 2 groups:
    - *Experimental group*: Is exposed to specific medication or intervention
    - *Reference group*: Is not exposed to specific medication or intervention
  - Then the groups are crossed-over (exposed group now becomes non-exposed and vice-versa)
  - Cross-over design RCT helps removing ethical concernsQ
- *Intention to treat trial*: Implies that the results of a RCT are unaffected by attrition (loss to follow up) or change over of study subjects from one group to anotherQ

I *Unit of study in RCT:*
Patient Q

Randomisation in RCT

- *Randomisation* in Randomized Controlled trial (RCT) is a statistical procedure by which participants are allocated into either of two groups, viz., *'Experimental Group'* (in which intervention is given) and *'Reference Group'* (in which intervention is not given)
- *Randomisation is best done by 'Random number tables'*
- *The essential purposes of randomization in a randomized controlled trial*Q:
  - Participants have *'Equal and Known Chance*Q*'* of falling into either 'Experimental Group' or 'Reference Group'
  - To *eliminate Selection Bias*Q
  - To *ensure comparability* among two groupsQ
  - To have *'similar prognostic factors'* among two groupsQ
- Randomisation is known as *'Heart of a trial*Q*'*
- Randomization *'removes both confounding and bias'*
  - *Randomisation IS SUPERIOR to Matching*: Randomization ensures *'both known and unknown'* confounding factors are distributed equally among the two groups, thereby nullifying their effect on result (whereas matching is useful for only known confounding factors)

I The essential purposes of randomization
To *eliminate Selection Bias*

I Randomisation is known as
'Heart of a trial

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Pre-post Clinical Trial

- *Does not have a true control group:* Patient act as his or her own control[Q]
- *Each patient has a pre-test score followed by a post-test:* Difference in scores reflect change attributed to intervention
- *Use:* Is often used in assessing whether knowledge, attitudes or pre-existing risk behaviors change when a subject is assigned to an intervention
- *Limitations:*
  - Difficult to assess if change is due to developmental intercourse
  - Difficult to assess if change is due to regression to mean
  - Not useful in studies involving mortality as post-test won't be available
  - More difficult to interpret than the comparable parallel clinical trial
  - Cannot be randomized

I Pre-post Clinical Trial
Patient act as his or her own control[Q]

Pre-Clinical and Clinical Trials

Phase	Unit of study	Purpose
PRECLINICAL PHASE		
Lab experiments	Animals[Q]	Pretesting
CLINICAL PHASES		
Phase 0	Healthy human volunteers	Micro-dosing[Q]
Phase I	Healthy human volunteers[Q]	Safety and non-toxicity profile[Q]
Phase II	Patients	Effectiveness
Phase III	Patients	Comparison with existing drugs[Q]
Phase IV	Patients	Long term side effects[Q]

I *Phase III is a RCT*

- *Phase III is a RCT:* Comparison of a new drug with an existing old drug[Q]
- *New drug is launched in market after:* Phase III
- Longest phase of a trial: Phase IV
- *Post-marketing surveillance:* Phase IV[Q]
- Maximum tolerated dose (MTD) of a drug: Phase I[Q]

I *Post-marketing surveillance:* Phase IV

Meta-analysis

- Description:
  - An objective, systematic review that employs statistical methods to combine and summarize the results of several studies[Q]
  - A quantitative synthesis of all unbiased evidence, meant for summarizing large volume of data, establishing and determining the magnitude of an effect, and to increase power and precision of studies
- Results:
  - *Forest plot*[Q]: To describe the distribution of your effect sizes
  - *Funnel plot*[Q]: To check the existence of publication bias
- *Strengths*[Q]:
  - Provides a point estimate of an effect size
  - Commonly report confidence intervals around effect sizes
  - Identify few gaps in a particular field
- *Limitations*[Q]:
  - *GIGO (Garbage in, garbage out)*: Results can only be as good as the original data is valid
  - *Apples and oranges effect*: Tendency to average/mash together different effects
  - *File drawer effect*: Publication bias
  - Relies on shared subjectivity rather than objectivity

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ASSOCIATION AND CAUSATION

Hill's (Surgeon General's) Criteria of Causal Association[Q]

I *Temporal association:* Is *'most important criterion'* of causal association

- *Temporal association:* Implies *'cause precedes effect' or 'effect follows cause'*
  - Considers both *'order of appearance' as well as ' length of interval between exposure and disease'*
  - Is *'most important criterion'* of causal association[Q]
  - Is *'best established by a cohort study'* (Especially Concurrent cohort study)[Q]
- *Strength of association:*
  - Relative risk (cohort study)
  - Odds ratio (case control study)
- *Specificity of association:* Implies that disease under study is caused only by risk factor under study
  - Is *'most difficult criterion to establish[Q]'*
  - Is *'weakest criterion'* of causal association
- *Consistency of association[Q]:* Implies that results are replicable in different settings and by different methods
- *Biological plausibility:* Implies existence of biological credibility of association (anatomically, physiologically explainable/ justifiable)
- *Coherence of association:* Implies that the causal association must be coherent (supported by) with relevant facts/related studies
- *Dose-response relationship[Q]:* Implies that increase in dose of cause increases incidence/ prevalence of effect
- *Cessation of exposure; Reversibility:* Implies that removal of possible cause reduces the risk of disease
- *Study design:* Implies that if study design is based on a strong study design

EPIDEMIOLOGY OF INFECTIOUS DISEASES

Definitions[Q]

- *Infectivity:* Number infected/ Number exposed
- *Pathogenicity:* Number of diseased/ Number infected
- *Virulence:* Number of serious condition & mortality/ Number diseased
- *Case fatality:* Number of deaths/ Number of cases
- *Communicability:* Ability of a disease to spread from infective to susceptible hosts

Zoonoses

I *Anthropozoonoses:* Infections transmitted from animals (zoo) to man (anthro)

- *Zoonoses:* An infection or infectious disease transmissible under natural conditions from vertebrate animals to man
- *Classification of Zoonoses based on direction of transmission:*
  - *Anthropozoonoses*: Infections transmitted from animals (zoo) to man (anthro)
    - *Examples:* Rabies[Q], Plague, Anthrax, Hydatid disease, Trichinosis
  - *Zooanthroponoses*: Infections transmitted from man (anthro) to animals (zoo)
    - *Example:* Human TB in cattle
  - *Amphixenosis*: Infections transmitted in either direction between animals and man
    - *Example:* Trypanosoma cruzi, Schistosoma japonicum
- *Classification of Zoonoses based upon life cycle of infecting organism:*
  - *Direct zoonoses*: Transmitted from infected to susceptible vertebrate host by direct contact/ fomite/ vector. Examples: Rabies, Brucellosis, Trichinosis
  - *Cyclo-zoonoses*: Involve more than one vertebrate species. Examples: Taeniasis, Echinococcosis

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- *Meta-zoonoses*: Transmitted biologically by invertebrate vectors. Examples: Plague[Q], Schistosomiasis, Arboviral infections
- *Sapro-zoonoses*: Involves non-animal developmental site or reservoir.
  - Examples: Mycoses, Larva migrans

- *Related terminology:*
  - *Reverse Zoonoses*: Is synonymous with Zooanthroponoses
  - *Epizootic*: Outbreak (epidemic) of a disease in animal population. Examples: Anthrax, Brucellosis, Influenza, Rabies, Rift Valley Fever, Q-fever, Japanese encephalitis, Equine encephalitis
  - *Enzootic*: Endemic of disease occurring in animals. Examples: Anthrax, Rabies, Brucellosis, Bovine TB, Endemic typhus, Tick typhus
  - *Epornithic*: Outbreak (epidemic) of a disease in bird population

Meta-zoonoses: Transmitted biologically by invertebrate vectors. Example: Plague

Endemic

- *Endemic:* refers to the '*usual or expected frequency of disease*' within a population group; is the '*constant presence of a disease in a defined geographical area*'
  - *Hyperendemic*: When a disease is constantly present at a high incidence and/or prevalence rate and affects all age groups equally.
  - *Holoendemic*: When a disease has a high level of infection beginning early in life and affects most of children population. So, disease is more common among children than adults
  - For the disease to be in an endemic steady state: R0 × S = 1 [where, R0 = Basic reproduction number of an infection (the mean number of secondary cases a typical single infected case will cause in a population with no immunity and in the absence of interventions); S = Proportion of susceptibles in population]
- *Endemic curve:* Is drawn between no. of cases due to a disease and the time
  - *Endemic curve IS NOT a straight line*: as number of cases for the endemic disease in a population will not be fixed throughout a year; it will show a seasonal or other variation
  - *Endemic curve Vs epidemic curve*: In endemic curve, the baseline of the curve NEVER touches zero

Serial interval[Q]*:* is the gap in onset between primary case (first case in the community) and secondary case

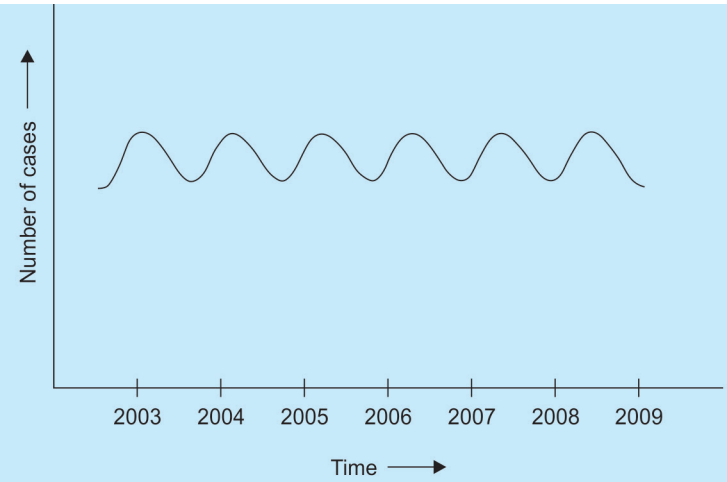

Figure: Endemic curve

  - When a disease occurs '*clearly in excess of normal expectancy*', it becomes an *Epidemic*
- *Ecdemic:* of or relating to a disease that originates outside the geographical area in which it occurs

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DISEASE TRANSMISSION

Definitions

- *Incubation period*[Q]*:* is the time interval between invasion by an infectious agent and appearance of the first sign or symptom of the disease in question
- *Median incubation period*[Q]*:* Is the time required for 50% of cases to occur
- *Generation time*[Q]*:* is the time taken for a person from receipt of infection to develop maximum infectivity
  - Is roughly equal to the incubation period of the disease
- *Latent period:* Is the period from disease initiation to disease detection, used in non-infectious diseases as equivalent of incubation period
- *Serial interval*[Q]*:* is the gap in onset between primary case (first case in the community) and secondary case (case developing through infection from the primary case)
  - By collecting information on series of secondary cases with serial intervals, one can guess the incubation period of a disease
- *Period of communicability:* is the time during which an infectious agent may be transferred directly/indirectly from an infected person to another person, from infected animal to man or from an infected person to animal, including arthropods
  - An important measure of communicability is secondary attack rate

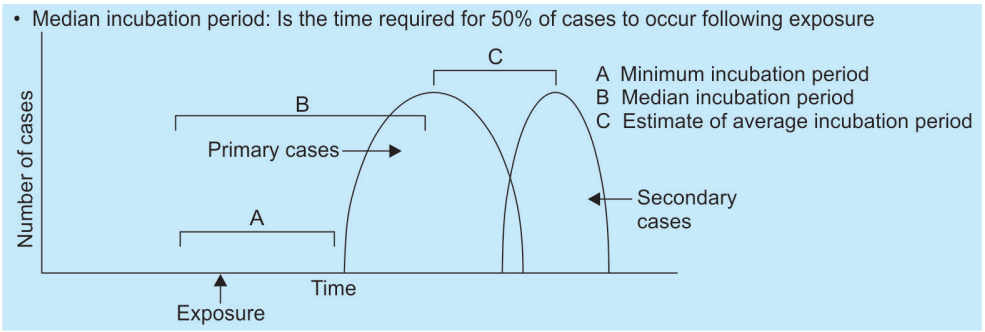

Figure: Incubation period and serial interval

Incubation Period

- *Incubation period depends upon*[Q]*:*
  - Generation time of the pathogen
  - Infective dose
  - Portal of entry
  - Individual susceptibility
- *Incubation period of a disease is useful for*[Q]*:*
  - Tracing the source of infection and contacts
  - Determining the period of surveillance
  - Applying immunization principles for prevention of diseases
  - Identification of point source or propagated epidemics
  - Estimating prognosis of a disease

Attack Rate (AR)

- Relates to no. of cases in the population at risk
- Reflects extent of epidemic
- Is used when 'population is exposed to risk for a limited period of time, such as epidemic'

$$AR = \frac{\text{No. of new cases of specified disease in a specified time interval}}{\text{Total population at risk during the same time interval}} \times 100$$

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Secondary Attack Rate

- *Secondary Attack Rate (SAR[Q]):* Is no. of exposed persons developing the disease within range of incubation period (IP), following exposure to the primary case

$$SAR = \frac{\text{No. of exposed persons developing disease within range of IP}}{\text{Total no. of exposed '}susceptible\text{' contacts}} \times 100$$

  - Denominator includes *only those susceptible in close contact*[Q]
  - *Primary case is always excluded both from numerator and denominator* for SAR calculation
- Secondary Attack Rate (SAR) of few diseases:

Disease	Secondary Attack Rate (SAR)
Small pox	30 – 45%
Measles[Q]	> 80%
Chicken pox[Q]	~90%
Mumps[Q]	~86%
Pertussis	~90%

> *Primary case is always excluded both from numerator and denominator for* SAR calculation

Source

- *Source:* Is a person, animal, object or substance from which an infectious agent passes or is disseminated to the host
  - Source refers to immediate source of infection & may or may not be part of reservoir

Reservoir

- *Reservoir*[Q]*:* Is any person, animal, arthropod, plant, soil or substance (or combination of these) in which an infectious agent lives & multiplies, on which it primarily depends for survival, & where it reproduces itself in such a manner that it can be transmitted to a susceptible host
- *Human Reservoir:*
  - *Cases*: Persons having particular disease, health disorder or condition under investigation
  - *Carriers*: Infected person or animal that harbours a specific agent in the absence of discernible clinical disease, & serves as a potential source of infection for others; *Carriers are less infectious than cases but are more dangerous epidemiologically*
- *Animal reservoir:* E.g. Rabies, Influenza, Yellow Fever, Histoplasmosis
- *Reservoir in non-living things:* E.g. Soil harbour agents for Tetanus, Anthrax, Coccidiomycosis, Mycetoma

Infection	Source	Reservoir
Hookworm	Soil[Q]	Man[Q]
Tetanus	Soil[Q]	Soil[Q]
Typhoid	Feces/urine/Food/Milk/Water	Case/ Carrier

Cases

- *Cases:* Persons having particular disease, health disorder or condition under investigation
  - *Clinical cases*: Mild, Moderate, Severe or Fatal
  - *Subclinical cases*: Inapparent, covert, missed or abortive
  - *Latent Infection*: Host does not shed the infectious agent which lies dormant in host without symptoms. (E.g. Herpes simplex, Brill Zinsser Disease, Ancylostomiasis)

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Cases in Epidemiology

- *Primary case:* First case of communicable disease introduced into the population unit being studied
- *Secondary cases:* Cases that develop from contact with the primary case
- *Index case*[Q]*:* First case that comes to the notice of the investigator (first case reported to the health system)

Index case[Q]: First case that comes to the notice of the investigator

Carriers

- *Carriers:* Infected person or animal that harbours a specific agent in the absence of discernible clinical disease, & serves as a potential source of infection for others
  - *Carriers are less infectious than cases but are more dangerous epidemiologically*[Q]
- *Carriers by type:*
  - *Incubatory Carriers*: shed infectious agent during incubation period of disease, e.g. Measles, Mumps, Polio, Pertussis, Influenza, Diphtheria, Hepatitis-B[Q]
  - *Convalescent Carriers*: shed the disease agent during the period of Convalescence, e.g. Typhoid, Bacillary Dysentery, Amoebic Dysentery, Cholera, Diphtheria & Pertussis[Q] (*Clinical recovery does not coincide with bacteriological recovery*[Q])
  - *Healthy carriers*: emerge from subclinical cases without suffering from overt disease, e.g. Poliomyelitis, Cholera, Meningococcal Meningitis, Diphtheria & Salmonellosis
- *Carriers by duration:*
  - *Temporary Carriers*: shed infectious agent for short periods of time, e.g. Incubatory carriers, Convalescent carriers, Healthy carriers
  - *Chronic Carriers*: excretes infectious agents for indefinite periods, e.g. Typhoid, Hepatitis-B, Dysentery, Meningococcal Meningitis, Malaria, Gonorrhoea, etc
- *Carriers by portal of exit:*
  - Urinary carriers, e.g. typhoid
  - Intestinal carriers, e.g. typhoid, cholera, amoebiasis
  - Nasal carriers, e.g. Diphtheria, staphylococcal food poisoning
  - Respiratory carriers
  - Nasopharyngeal carriers, e.g. Meningococcus

INVESTIGATION OF AN EPIDEMIC

Objectives of Investigation of an Epidemic

- To define magnitude or involvement (time, place, person)
- To determine responsible conditions and factors
- To identify causes, source(s) and modes of transmission
- To make recommendations to prevent reoccurrence

Steps for Investigation of an Epidemic

- *Verification of diagnosis:*
  - Is the *'first step in investigation of an epidemic*[Q]*'*
  - It is *'not necessary to examine all cases'*: take sample
  - Do not wait for laboratory results for epidemiological investigations
- *Confirmation of existence of an epidemic:*
  - Compare with disease frequencies during same period in previous years
  - *Epidemic threshold*: An arbitrary limit of *'2 standard errors from the endemic occurrence'*
- *Defining the population at risk:*
  - Obtaining the map of the area
  - Calculation of *'appropriate denominator of population at risk'*

Verification of diagnosis: Is the *'first step in investigation of an epidemic*[Q]*'*

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- *Rapid search for all cases and their characteristics:*
  - Medical survey
  - Epidemiological case sheet
  - Searching for more cases: Search for new cases is carried out everyday, till the area is declared free of epidemic; this period is usually taken as *'twice the incubation period of the disease since the occurrence of last case*[Q]*'*
- *Data analysis:*
  - Time: Construction of an epidemic curve
  - Place: Preparation of a spot map
  - Person: Analysis by age, sex, occupation and other risk factors
- *Formulation of hypothesis*
- *Testing of hypothesis*
- *Evaluation of ecological factors*
- *Further investigation of population at risk*
- *Writing the report*

I Search for new cases is carried out everyday, till the area is declared free of epidemic; this period is usually taken as *'twice the incubation period of the disease since the occurrence of last case*[Q]*'*

IMMUNITY, VACCINES AND COLD CHAIN

Vaccine

- *Vaccine:* Is an immuno-biological substance designed to produce specific protection against a given disease

I *First vaccine to be developed*[Q]*: Small pox (1798)*

History of Vaccination

- *Term 'Vaccine' was coined by:* Louis Pasteur[Q]
- *Term 'Vaccination' was coined by:* Edward Jenner[Q]
- *First vaccine to be developed*[Q]*:* Small pox (1798)
- *First vaccine was developed by:* Edward Jenner
- *Important milestones in vaccination:*

Year	Vaccine
1798	Small pox vaccine
1885	Rabies vaccine
1892	Cholera vaccine
1921	BCG vaccine
1923	Diphtheria toxoid
1923	Pertussis vaccine
1927	Tetanus toxoid
1937	Influenza vaccine
1937	Yellow fever vaccine
1949	Mumps vaccine
1954	IPV
1957	OPV
1960	Measles vaccine
1962	Rubella vaccine
1968	Type C meningococcal vaccine
1971	Type A meningococcal vaccine
1976	Hepatitis B vaccine
1986	Recombinant Hepatitis B vaccine
2006	Live Oral Rotavirus vaccine
2007	Human Papilloma virus vaccine

Types of Vaccines

- *Live 'attenuated' vaccines:*
  - Are prepared from repeated passage of organisms in tissue culture or chick embryos

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- Attenuation implies *'Reduced pathogenicity/ virulence; Maintained antigenicity/ immunogenicity*[Q]*'*

I Attenuation implies *'Reduced pathogenicity/ virulence; Maintained antigenicity/ immunogenicity*[Q]*'*

- *Inactivated/ Killed vaccines:*
  - Organisms killed by heat or chemicals stimulate active immunity, when introduced in body
  - Safe but less efficacious than live vaccines
  - Usually administered by intramuscular or subcutaneous route
- *Toxoids:*
  - Toxins produced by organisms are detoxicated and used for vaccine preparation
  - Highly efficacious and safe
- *Cellular fractions:*
  - Vaccines are prepared from extracted cellular fractions
- *Combination (or Mixed) vaccines:*
  - More than one kind of immunizing agents is used in vaccine

Strains of Commonly Used Vaccines

Vaccine	Strain(s)[Q]
BCG	Danish-1331 strain (WHO recommended)
OPV/ IPV	P1, P2, P3 strains (Monovalent or Trivalent)
Measles vaccine	Edmonston Zagreb strain (MC) Schwartz strain Moraten strain
Mumps vaccine	Jeryll Lynn strain
Rubella vaccine	RA 27/3
Yellow Fever vaccine	17 D strain
Varicella vaccine	OKA strain
Japanese Encephalitis vaccine	Nakayama strain Beijing P3 strain SA 14-14-2 (Used in India)
Swine Flu Vaccine (killed)	A7/ California/ 2009
Malaria vaccine	SPf 66 strain (Lytic Coktail) Pf 25 strain
HIV vaccines	mVA (modified Vaccinia Ankara) strain rAAV (recombinant Adeno associated viral vaccine) strain CTL (Cytotoxic T- lymphocytic) strain AIDSVAX strain Subunit Vaccine strain

I *Rubella vaccine* RA 27/3
Yellow Fever vaccine 17 D strain

Contraindications to Vaccines

- *Vaccines contraindicated in Pregnancy*[Q]*:* All live vaccines EXCEPT Yellow fever vaccine
- *Vaccines contraindicated in HIV*[Q]*:*
  - Asymptomatic HIV: NONE
  - Symptomatic HIV: All live vaccines EXCEPT BCG vaccine
- *Vaccines contraindicated in Immuno-suppression:* All live vaccines
- *Vaccines contraindicated in Corticosteroid therapy:* All live vaccines
- *Vaccines contraindicated in fever:* Typhoid vaccines
  - Typhoral
  - Typhim – Vi
  - TAB
- *Vaccines contraindicated in ARTI/ diarrhoea:* NONE
- *Vaccines contraindicated together:* Yellow fever and Cholera vaccine

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- *Vaccine contraindicated in Preterm-premature baby with birth weight < 2 kg*[Q]*:* Hepatitis B
- *Vaccines contraindicated in age < 1 year (infants):*
  - Yellow fever vaccine
  - Meningococcal vaccine
  - Pneumococcal vaccine
- *Vaccines contraindicated in age < 2 year (infants):*
  - Meningococcal vaccine
  - Pneumococcal vaccine
  - Typhoid vaccines
- *Vaccine contraindicated in age > 2 year (infants):* Pertussis vaccine (may lead to neurological complications – 1 per 1,70,000 vaccines) [Although now give till 5-6 years in NIS, India]
- *Vaccine contraindicated in progressive neurological disease:* Pertussis vaccine (Pertussis vaccine IS NOT CONTRAINDICATED IN epilepsy controlled on medications, Cerebral palsy)
- *Only absolute contraindication to killed vaccines:* Severe local or general reaction to a previous dose

I *Vaccines contraindicated in Pregnancy*[Q]*:* All live vaccines

I *Vaccine associated paralysis:* OPV (Sabin)[Q]

Specific Side-effects of Vaccines

- *Guillain Barré Syndrome:* Killed influenza vaccine[Q]
- *Vaccine associated paralysis:* OPV (Sabin)[Q]
- *Toxic shock syndrome (TSS):* Measles vaccine, MMR[Q]
- *Shock:* DPT, Pertussis vaccine[Q]
- *Hypersensitivity:* Hep-B, Meningococcal vaccine, DPT, dT[Q]

General Rules for Multiple Vaccine Administration

- 2 live vaccines can be given together
- Live and killed vaccines can be given together
- Multiple vaccines can be given together
- Cholera vaccine and Yellow fever vaccine cannot be given together
- OPV is a live vaccine where single dose is not sufficient for immunization

Live Vaccines

- Live vaccines are prepared from live attenuated organisms
  - *Attenuation*: Reduced pathogenicity/ virulence BUT maintained antigenicity/ immunogenicity[Q]
- *Live vaccines are more potent agents than killed vaccines*[Q]*:*
  - Multiply in the host and the resulting antigenic host is larger than what is injected
  - Have all the major and minor antigenic components
  - Engage certain tissues of the body (e.g. intestinal mucosa by OPV)
  - There may be other mechanisms such as persistence of latent virus
- *General properties to Live vaccines:*
  - Immunization is generally achieved with a single dose (EXCEPT OPV[Q])
  - Should not be administered to immuno-deficient/ immuno-suppressed
  - 2 live vaccines can be administered simultaneously at different sites (or at an interval of 3 weeks)
- *Examples of Live 'attenuated' vaccines:*
  - *BCG – OPV (Sabin – Oral polio vaccine)*
  - *Measles vaccine – Mumps vaccine*
  - *Rubella vaccine – Yellow fever vaccine*
  - *Typhoral – Live plague vaccine*
  - *LAIV (live attenuated influenza vaccine) – Varicella vaccine*
  - Epidemic typhus vaccine

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BCG Vaccine

I *WHO recommended strain: DANISH 1331 strain*[Q]

I *BCG is a lyophiliosed (freeze dried) vaccine:*

I *Strength:* 0.1 mg in 0.1 ml

- BCG stands for '*Bacille Calmette Guerin*[Q]' – an '*avirulent strain*' produced by 239 subcultures over a period of 13 years
- *Type of vaccine:* Live attenuated vaccine
  - *Liquid (fresh) type vaccine*
  - *Freeze dried (lyophilized) vaccine*: More stable; used currently
- *WHO recommended strain: DANISH 1331 strain*[Q]
  - *Vaccine strain is derived from 'Mycobacterium bovis'*[Q]
  - Prepared at BCG laboratory, Guindy, Chennai in India[Q]
- *BCG is a lyophiliosed (freeze dried) vaccine:*
  - Is reconstituted with Normal Saline (NaCl) as diluent[Q]
  - Must be used within 4 hours of reconstitution
- *Dose:* 0.1 ml (for all ages[Q])
- *Strength:* 0.1 mg in 0.1 ml
- *Route:* Intra-dermal[Q]
  - Tuberculin syringe (Omega microstat syringe, 26 gauge needle)
- *Site:* Skin over left deltoid muscle[Q]
  - Left deltoid muscle is chosen ONLY by convention
- *Age for vaccination:*
  - *Direct BCG*[Q]: Is administered upto 1 year age, without Mantoux Test
  - *Indirect BCG*: Beyond age 1 year, it is recommended after prior Mantoux Test
- *Phenomena after vaccination*[Q]*:*
  - After 2 – 3 weeks: Papule formation
  - 5 weeks: 4 – 8 mm diameter of papule
  - 6 – 8 weeks: Breaks into a shallow ulcer, seen covered with a crust
  - 6 – 12 weeks: Permanent tiny, round scar, typically 4 – 8 mm diameter
  - 8 – 14 weeks: Mantoux test becomes positive[Q]
- *Protective efficacy:*
  - For pulmonary tuberculosis: 0% (Zero)
  - For severe forms of tuberculosis[Q]: 0 – 80% (median 50%)
  - For Leprosy: 20 – 40%
- *Protective duration: 20 years*[Q]
- *Complications:*
  - Prolonged severe ulceration at site of vaccination
  - Suppurative lymphadenitis[Q]
  - Osteomyelitis
  - Disseminated BCG infection
  - Death

Measles Vaccine

I Measles Vaccine
Route: Subcutaneous[Q]

I *IP of vaccine induced measles:* 7 days[Q]

- *Type:* Live attenuated, lyophilized (Freeze dried[Q]) vaccine (Tissue culture vaccines – Chick embryo or Human diploid cell line)
- *Strains used:*
  - Edmonston Zagreb Strain (Most Common[Q])
  - Schwartz Strain
  - Moraten Strain
- *Dose:* 0.5 ml
- *Route:* Subcutaneous[Q]
- *Site:* Right arm
- *Age of administration in National Immunization schedule (India):* 9 months[Q] (can be lowered to 6-9 months in epidemics & malnutrition) & 16–24 months
- *Diluent for Reconstitution: Distilled Water or sterile water*[Q]
  - *Use within 4 hours after reconstitution with diluent*
- Measles (& MMR) vaccine can lead to Toxic Shock Syndrome
- Measles vaccine is contraindicated in pregnancy
- *Cold chain Temperature for storage:* +2 to +8°C

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- *Protective efficacy*[Q]*:* > 90% (with one dose), > 99% (2 doses)
- *Duration of Protection:* Life long
- *IP of vaccine induced measles:* 7 days[Q]
- *Ideal gap between 2 successive doses of Measles vaccine:* 6 months[Q]

Poliomyelitis Vaccines[Q]

	OPV (Sabin)	IPV (Salk)
Type of vaccine	Live attenuated virus	Killed formolised virus
Mode of administration	Oral	Subcutaneous or i.m.
Type of immunity[Q]	Humoral + Intestinal (local)	Humoral
Prevention of	Paralysis + intestinal re-infection	Paralysis
Control of epidemics	Effective	Not useful
Manufacture	Easy	Difficult
Cost	Cheaper	Expensive
Storage & transport	Require sub-zero temperatures	Less stringent conditions
Shelf life	Short	Longer
VAPP	1 per 1 million vaccinees	Zero incidence

Inactivated (Salk) Polio Vaccine (IPV)

- Is a type of killed vaccine
- *Schedule:* First 3 doses at 1-2 month interval each and 4th dose after 6-12 months of last dose
- Induces Humoral immunity (IgM, IgG, IgA); NO LOCAL IMMUNITY
- *Composition of IPV:*

Components	Strength
Poliovirus type 1	20 D antigen units
Poliovirus type 2	2 D antigen units
Poliovirus type 3	4 D antigen units

- *Advantages of IPV:*
  - Safe in immunodeficiency disorders
  - Safe in persons on radiation therapy/ corticosteroid therapy
  - Useful in those over 50 years age
  - Safe during pregnancy[Q]
  - No risk of Vaccine associated paralytic polio (VAPP[Q])
- *IPV is unsuitable in epidemics:*
  - Immunity is not rapidly achieved as > 1 doses required
  - Injections can precipitate paralysis during epidemics
- *Composition of Improved IPV:*

Components	Strength
Poliovirus type 1	40 D antigen units
Poliovirus type 2	8 D antigen units
Poliovirus type 3	32 D antigen units

Oral (Sabin) Polio Vaccine (OPV)

- *Is a live attenuated 'trivalent' vaccine:* Contains 3 strains of polio virus
- Schedule for OPV in NIS, India:

Dose	Age
OPV-0 (Zero dose)	At birth
OPV-1	6 weeks
OPV-2	10 weeks
OPV-3	14 weeks
OPV-B (Booster dose)	16-24 months

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I OPV Induces *'both systemic as well as local immunity'*

- *Mechanism of action:*
  - *Primary multiplication*: Intestinal epithelial cells
  - *SECONDARY MULTIPLICATION*Q: Peyer's patches (leads to viraemia)
  - Induces *'both systemic as well as local immunity'* (Nasal & duodenal IgA, Serum IgM, IgG, IgA)
- *Composition of OPV*Q*:*

Components	Strength
Poliovirus type 1	3 lac TCID 50
Poliovirus type 2	1 lac TCID 50
*Poliovirus type 3*Q	3 lac TCID 50

- *Dose:* 2 drops (EQUIVALENT TO 0.1 mlQ)
- *Advantages of OPV*Q*:*
  - Easy to administer
  - Induces both humoral and systemic immunity
  - Single dose also produces substantial immunity
  - Vaccines spread immunity to others by excretion of virus
  - Relatively inexpensive
  - Useful in controlling epidemics
- *Complication:* Can lead to Vaccine associated paralytic poliomyelitis (VAPP)
  - 1 case per 1 million vaccinesQ
- OPV is quite a thermolabile vaccine
- OPV should not be repeatedly freezed and thawed
- *Cold chain temperature for long term storage:* –20° C to –40° C
- *During transportation, OPV should be kept on:*
  - Dry ice (solidified carbon dioxide)Q
  - A freezing mixture (wet ice + ammonium chloride)
  - *Heat-stabilized OPV vaccine*: Can be kept without loosing potency for 1 year at 4° C and for a month at room temperature

Vaccine Vial Monitor

I *VVM is a marker of potency but measures cumulative heat exposure overtime*

- *VVM is a marker of potency:* VVM is a simple tool which enables vaccinator to know if vaccine is potent at the time of administration
  - VVM) is a label containing a heat-sensitive material which is placed on a vaccine vial to register cumulative heat exposure over time
- *VVM indicates efficiency of cold chain*Q *(temperature maintenance)*
- *VVM is a mark on OPV vial consisting of:*
  - An outer circle
  - An inner square (made of heat sensitive material)

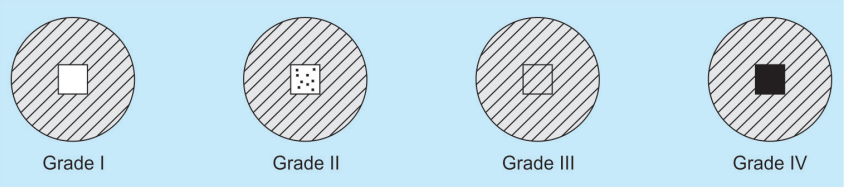

Figure: Vaccine vial monitor

- *WHO grading of VVM in OPV:*
  - *Is based on colour changes in VVM*: ONLY INNER SQUARE CHANGES COLOUR, circle always remain blue
  - *Based on VVM, OPV is usable upto Grade II*Q

WHO Grade	Outer Circle	Inner Square	Inferenceq
Grade I	Blue	White	OPV can be used
Grade II	Blue	Light blue	OPV can be used
Grade III	Blue	Blue	OPV CANNOT be used
Grade IV	Blue	Purple/ Black	OPV CANNOT be used

(Grade III is Discard point)

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DPT Vaccine

- *Type:* Combined TRIPLE vaccine for Diphtheria, Pertussis & Tetanus; D & T are Toxoids, P is killed acellular bacilli
- *Dose:* 0.5 ml
- *Route:* Intramuscular[Q]
- *Site:* Antero-lateral aspect of thigh, middle 1/3 (earlier it was administered at gluteal region ,but presence of fat in buttocks breaks the adjuvant & reduces absorption of DPT vaccine)
- *Composition of DPT Vaccine:*

Contents	Amount per dose (0.5 ml)	
	Glaxo	Kasauli
Diphtheria Toxoid	25 Lf[Q]	30 Lf
Tetanus Toxoid	5 Lf	10 Lf
Pertussis killed acellular bacilli	20,000 million	32,000 million
Aluminium phosphate	2.5 mg	3.0 mg
Thiomersal	0.01 %	0.01%

  - *Aluminium phosphate or aluminium hydroxide is used as adjuvant in DPT vaccine*: It increases immunogenicity of vaccine[Q]
  - *Thiomersal is used as preservative* in DPT Vaccine[Q]
- *Age for immunization in National Immunization schedule (NIS,India):*

Dose	Age
DPT_1	6 weeks of age
DPT_2	10 weeks of age
DPT_3	14 weeks of age
$DPT_{Booster}$	16-24 months of age
$DPT_{Booster}$	5 years of age

  - *Recommended interval between 3 successive doses*: 1 month
  - 2 months gap between 2 successive doses of DPT do not offer any advantage over one-month interval
- *Absolute Contraindications to DPT vaccine:*
  - Severe hypersensitivity reaction to previous dose
  - Progressive neurological disease (E.g. active Epilepsy) [Cerebral palsy & seizures controlled on anti-epileptics do not preclude the use of DPT; DPT should be given under these circumstances]

Disease	Vaccine status for DPT
Active Epilepsy	Contraindicated
Epilepsy controlled on antiepileptic	Can be given
Cerebral Palsy	Can be given

- *DPT vaccine (& Measles vaccine) can result in fever:* Antipyretic is given with DPT vaccine as 'take home, need based' medication
- *Cold Chain Temperature of DPT:* +2° to +8°C
  - *If DPT vaccine gets frozen accidentally*: discard the vaccine
- *Adult type of Diphtheria – tetanus vaccine (dT):* contains up to 2 Lf of diphtheria toxoid per dose; given 2 doses 4-6 weeks apart, followed by a booster after 6-12 months; is useful for immunizing children over 12 yrs of age & adults

I *Aluminium phosphate or aluminium hydroxide is used as adjuvant in DPT vaccine:* It increases immunogenicity of vaccine[Q]

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For Other Vaccines

Refer to Chapter 5, Theory

New National Immunization Schedule (NIS, India) 2016

Age	Vaccines Given
At birth	BCG , OPV0
At 06 weeks (1 ½ months)	DPT_1 , OPV_1, $HepB_1$, HiB_1
At 10 weeks (2 ½ months)	DPT_2 , OPV_2, $HepB_2$, HiB_2
At 14 weeks (3 ½ months)	DPT_3 , OPV_3, $HepB_3$, HiB_3, IPV
At 9 months (completed)	$Measles_{1st\ dose}$, Vitamin–A (1 Lac IU)
Vitamin-A (2 Lac IU) every 6 months till age of 5 years	
16–24 months	DPTB , OPVB , JELive, Measles2nd dose
At 5–6 years	DPT
At 10 years	TT
At 16 years	TT
For pregnant women	TT_1 and TT_2 (one month apart) $TT_{Booster}$ if 2TT doses received in last 3 years

(JE Vaccine only in 110 districts) (HiB introduced as Pentavalent vaccine – 'HiB + HepB + DPT' in 18 states) (IPV to be introduced in 6 states)

Important Practical Considerations Under NIS

- *Vitamin-A* is given at 9th, 18th, 24th, 30th, 36th, 42th, 48th, 54th, 60th months (A total of 1 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac = 17 Lac IU is given to a completely immunized child by 5 years of age[Q])
- *OPV:* Minimum 5 doses are required for development of immunity[Q]
- *DPT:* Minimum 3 doses are given a month apart with booster after 1 year of the 3rd dose (and another booster at 5-6 years age)
- *TT:* A fully immunized adult (excluding pregnancy in females) would have received 7 doses of TT

Guidelines on TT in Pregnancy

- Primigravida: 2 doses 1 month apart, As soon as possible (New Guideline)
  OR TT1 (16-20 weeks) & TT2 (20-24 weeks) (Older Guideline)
  – *Duration of protection with 2 doses*: *All subsequent pregnancies in next 3 years*[Q]
- *Multigravida (completely immunized in last 3 years):* 1 booster dose[Q]
- *Multigravida (partially immunized in previous pregnancy in last 3 years):* 2 doses, 1 month apart
- *Multigravida (unimmunized in previous pregnancy in last 3 years):* 2 doses, 1 month apart
- *Multigravida (completely immunized in previous pregnancy earlier than 3 years):* 2 doses, 1 month apart
- *RULE FOR Delayed immunization of TT in pregnancy (as per Period of gestation – POG):* Give 2 doses of TT, 1 month apart, anytime in pregnancy, IRRESPECTIVE OF TIME OF DELIVERY (so as to provide protection for atleast next 3 years)

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Situations (pregnant female reporting for the 1st time at)	Recommendation	Status of patient
4½ month POG	2 doses; 1 each at 4½ m & 5½ m POG	Completely immunized for current pregnancy; subsequent half protection for next 3 years
5th month POG	2 doses; 1 each at 5th m & 6th m POG	
6th month POG	2 doses; 1 each at 6th m & 7th m POG	
7th month POG	2 doses; 1 each at 7th m & 8th m POG	
8th month POG	2 doses; 1 each at 8th m & 9th m POG	Partially immunized for current pregnancy; subsequent half protection for next 3 years
9th month POG	2 doses; 1st at 9th m POG & 2nd 1 m after (post-delivery)	
Just before delivery	2 doses; 1st before delivery & 2nd 1 m after	Unimmunized for current pregnancy; subsequent half protection for next 3 years
Post delivery	2 doses; 1 each at just after delivery & 1 m later (post-delivery)	

– *A child born to unimmunised/partially-immunized mother must be given protection*: Give 750 IU of antitoxin (heterologous serum) within 6 hours of birth

Age Limits for Delayed Immunization in NIS, India[Q]

Vaccine	Age limit	Reason for limit (if any)
BCG	Upto 1 year of age (Direct BCG)	Subclinical immunity develops > 1 yr age
OPV	Upto 5 years of age	Polio cases are MC in < 5 yrs age
HepB	Upto 1 year of age	–
Measles	Upto 5 year of age	Measles cases MC in < 5 yrs age
Vitamin A	Upto 5 year of age*	Xerophthalmia cases MC in < 5 yrs age
DPT	Upto 7 year of age	Diphtheria cases MC in < 7 yrs age
JE Vaccine	Upto 15 year of age	–
TT	NO AGE LIMIT	–

(* Vitamin A was earlier given till the age of 3 years)

Cases of Delayed Immunization

- **A completely unimmunized child 9 months of age should receive[Q]:** BCG, *DPT-1b(next two doses one month apart each and booster after 1 year of 3rd dose), OPV-1 (next two doses one month apart each and booster after 1 year of 3rd dose), HepB -1 (next two doses one month apart each),* Measles, and Vitamin A (1 Lac IU) and HiB-1 (1 dose one month later)
- **A completely unimmunized child 18 months of age should receive:** BCG *(Only after Mantoux Test: Indirect BCG),* DPT-1 *(next two doses one month apart each and booster after 1 year of 3rd dose),* OPV-1 *(next two doses one month apart each and booster after 1 year of 3rd dose),* Measles (if not suffered from measles disease previously), and Vitamin A *(2 Lac IU), HiB, JE*
- **A completely unimmunized child 30 months of age should receive:** BCG *(Only after Mantoux Test: Indirect BCG),* DPT-1, OPV-1 *(next two doses one month apart each and booster after 1 year of 3rd dose), Measles (if not suffered from measles disease previously),* and Vitamin A (2 Lac IU), JE
- **A completely unimmunized child 4 years of age should receive[Q]:** BCG *(Only after Mantoux Test: Indirect BCG),* DPT-1, OPV-1 *(next two doses one month apart each and booster after 1 year of 3rd dose), Measles (if not suffered from measles disease previously), Vitamin A (2 lac IU), JE*

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Mission Indradhanush 2014

***Launch*:** 25 December 2014[Q]
***Description*:** Indradhanush depicting seven colors of the rainbow, aims to cover all those children by 2020[Q] who are either unvaccinated, or are partially vaccinated against 7 vaccine preventable diseases *(7 VPD's)*[Q]

- Diphtheria
- Pertussis
- Tetanus
- Childhood Tuberculosis
- Poliomyelitis
- Hepatitis B
- Measles

***Strategy*:**

- *Focused and systematic immunization drive*: "Catch-up" campaign mode to cover all the children who have been left/ missed out[Q]
- *Four special vaccination campaigns*: January-June 2015 with intensive planning and monitoring
- *Learning of Polio program*: Apply in planning and implementation
- *Coverage*:
  - First phase: 201 districts
  - Second phase: 297 districts
  - 82 districts in 4 states of UP, Bihar, Madhya Pradesh and Rajasthan

Cold Chain

I +2° C to +8° C 'cold chain temperature of vaccines in India[Q]')

- *Cold chain:* Is a system of storage and transportation of vaccines from the point of manufacture to the point of administration (actual vaccination site)
- *Cold chain temperature of vaccines available in India:*
- *OPV (Sabin):*
  - Routine storage: +2° C to +8° C
  - Long term storage: –20° C to –40° C
- *Yellow fever vaccine:* –30° C to +5° C
- *All other vaccines:* +2° C to +8° C (Also known as the 'cold chain temperature of vaccines in India[Q]')
- *Diluents:* Can be stored in +2° C to +8° C **OR** can be kept outside cold chain (at room temperature)
- *Vitamin A:* Is stored outside cold chain (at room temperature)

Cold Chain Components (equipments) & Levels in India

Level	Component	Temperature	Storage duration
State/ Regional level	*Walk-in-cold rooms (WIC)*	+2° C to +8° C	3 months
	Walk-in-freezers (WIF)	–20° C to –40° C	
District level	*Large ILRs (Ice-lined refrigerator)*	+2° C to +8° C	1 month
	Large DFs (Deep freezers)	–20° C to –40° C	
PHC level	*Small ILRs*	+2° C to +8° C	1 month[a]
	Small DFs	–20° C to –40° C	
Sub-centre level	*Vaccine carriers*	+2° C to +8° C	48–72 hours
	Day carriers		
Session level	*Fully frozen icepack*	+2° C to +8° C	1–3 hours

I *Most important component of cold chain in India:* ILR[Q]

I *Instrument used to monitor the temperature of cold chain at PHC:* Dial Thermometer[Q]

- *Most important component of cold chain in India:* ILR[Q]
- *Temperature of cold chain in India:* +2° C to +8° C[Q]
- *Minimum level of vaccine storage (in cold chain) in India[Q]:* Primary health centre (below PHC level, vaccines are 'transported *to sub-centres on immunization days*' in vaccine carriers and day carriers)
- *Maximum chance of cold chain failure in India:* Sub-centre and village level[Q]
- *Instrument used to monitor the temperature of cold chain at PHC:* Dial Thermometer[Q]

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Ice-lined Refrigerator (ILR)

- Is *'most important component of cold chain'* in India
- *Temperature of ILR (Cold chain) in India:* +2° C to +8° C
- *Temperature monitoring of ILR:* Dial thermometer (Twice daily)
- *ILR is used for storage of:* All vaccines
- 300/240 litres ILRs are supplied to districts and 140 litres ILR is supplied to PHCs
- ILRs must be kept on a horizontal leveled surface, atleast 10 cms away from walls
- ILRs can maintain temperature of vaccines if provided *'with even 8 hours of uninterrupted electricity per day'*

Ice-pack

- Is prepared by keeping in a Deep freezer
- *Is used for:*
  - Temperature maintenance during vaccine transportation, in a vaccine carrier
  - Temperature maintenance during an immunization session
- Is of total 320 – 340 ml capacity
- Has a 'horizontal mark' – water fill level (as water expands on freezing)
  - NOTHING should be added to water for freezing in an ice-pack
- Has generally 2 holes – MEANT FOR keeping vaccines[Q]

Dial Thermometer

- Is the instrument used to monitor the temperature of cold chain at PHC
- Is kept in ILR (Ice-lined refrigerator- component of cold chain) at PHC
- Is *'based on principle of thermocouple*[Q]*'*
- *Recommended temperature monitoring at PHC level is:* Twice daily[Q]

Immunoglobulins

- *Types of immunoglobulins:*
  - IgG: comprises 85% of total serum immunoglobulins, largely extravascular, *'only class of immunoglobulins to cross placenta'*
  - IgM: comprises 10% of total serum immunoglobulins, *'indicative of recent infection'*, has high agglutinating and complement-fixating ability
  - IgA: comprises 15% of total serum immunoglobulins, predominantly found in secretions, '*primary defence mechanism at mucous membranes'*
  - IgD: exact function not known
  - IgE: concentrated in submucous tissues, *'responsible for immediate allergic anaphylaxis reaction'*
- *Preparations of immunoglobulins:*

	Human normal Ig's	Human specific Ig's
Source	Antibody-rich fraction obtained from a pool of > 1000 donors	Plasma of recovered patients or immunized individuals
Composition	> 90% IgG; less IgA	5 times antibody potential of standard preparation
Examples	Hepatitis A Measles Mumps Rabies Tetanus	Hepatitis B Varicella Diphtheria

I IgG: *'only class of immunoglobulins to cross placenta'*

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DISINFECTION

Definitions in Disinfection

- *Asepsis:* Prevention of contact with microorganisms
- *Cleaning*: Removal of adherent visible blood/soil/proteinaceous substances/ microorganisms/debris from surfaces, crevices, serrations, joints, lumens of instruments/devices/equipment by manual/mechanical process for handling or further decontamination
- *Detergent:* Surface cleaning agent (hydrophilic and lipophilic component) that acts by lowering surface tension
- *Disinfection:* Thermal or chemical destruction of most of the pathogens
- *Germicide:* Agent that destroys microorganisms, especially pathogens
- *Hospital disinfectant:* Disinfectant registered for use in any medical facility; efficacy is demonstrated against Salmonella choleraesuis, Staphylococcus aureus, Pseudomonas aeruginosa
- *Sanitizer:* Agent that reduces number of bacterial contaminants to safe levels as per public health requirements (mainly used for inanimate objects)
- *Sterile:* State of being free from all living microorganisms

Properties of Ideal Disinfectant [Mnemonic: SOURCES BEEN Fully Sterile]

- **S**oluble in water
- **O**dourless
- **U**naffected environmentally (active with organic matter; compatible with chemicals)
- **R**esidual effect
- **C**leaner
- **E**nvironmental friendly
- **S**table in concentration and use-dilution
- **B**road antimicrobial spectrum
- **E**asy to use
- **E**conomical
- **N**ontoxic
- **F**ast acting
- **S**urface compatible (non corrosive, no deterioration)

Chemical Disinfectants: Oxidizing Agents

- *Potassium permanganate:*
  - Aquariums
  - Feet before entering swimming pools
  - Fruits and vegetables
- *Hydrogen peroxide:* Bactericidal, virucidal, fungicidal. Sporicidal
  - Surfaces in hospital settings
  - Antiseptic
  - Cleaning wounds and discharging ulcers
- *Paracetic acid:*
  - Gram-positive, gram-negative bacteria
  - Fungi, yeasts, viruses

Chemical Disinfectants: Metals as Microbicides

- Silver (Prophylaxis of conjunctivitis, Topical therapy for burns, Bonding to indwelling catheters)
- Iron, Copper, Zinc

Chemical Disinfectants: Miscellaneous

- *Pasteurization:* 70 degrees Celsius for 30 minutes for pathogenic microorganisms except spores

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- *Microwaves:* Disinfect contact lenses, dental instruments, dentures, milk, urinary catheters, cultures
- *Flushing and Water Disinfectors:* Disinfect bedpans, urinals, washbowls, surgical instruments and anaesthesia tubes
- *Ultraviolet radiation:* Disinfect drinking water, air, titanium implants, contact lenses
- *Ozone*

Factors affecting Efficacy of Sterilization

- Cleaning
- Pathogen type
- Biofilm accumulation
- Lumen length, diameter
- Restricted flow
- Device design, construction

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MULTIPLE CHOICE QUESTIONS

DEFINITION AND EPIDEMIOLOGICAL METHODS

1. Residence of three villages with three different types of water supply were asked to participate in a study to identify cholera carriers. Because several cholera deaths had occurred in the recent past, virtually everyone present at the time submitted to examination. The proportion of residents in each village who were carriers was computed and compared. This study is a: *[AIIMS May 03]*
(a) Cross-sectional study
(b) Case-control study
(c) Concurrent cohort study
(d) Non-concurrent

2. The analytical study where population is the unit of study is: *[AIPGME 1996]*
(a) Cross sectional
(b) Ecological
(c) Case-control
(d) Cohort

3. All of the following are true about 'Evidence-based medicine' *except*: *[AIIMS November 2011]*
(a) Aims to apply best available evidence gained from scientific method to clinical decision making
(b) Research paper is investigated by the tools quoted in research paper itself to check validity
(c) Opinions of medical professionals and researchers have been given least importance
(d) Evidence is generated from weak and poor studies

4. Natural history of disease is studied with:
(a) Longitudinal studies *[Recent Question 2013]*
(b) Cross-sectional studies *[WBPG 2014]*
(c) Trials
(d) None

5. Cause to effect progression is seen in all *except*: *[DNB June 2010] [DNB December 2011]*
(a) Case control study
(b) Ecological study
(c) Cohort study
(d) Randomized control trial

6. Father of Evidence Based Medicine is *[AIIMS May 2014]*
(a) Sackett
(b) Da vinci
(c) Hippocrates
(d) Tolstoy

Review Questions

7. Hypothesis is a: *[MP 2000]*
(a) Axiom
(b) Verified variable
(c) Established document
(d) Variable to be tested

8. Studying distribution of disease or health related characteristics in human population and identifying the characteristics with which disease seem to associated is: *[MH 2002]*
(a) Descriptive epidemiology
(b) Experimental epidemiology
(c) Analytical epidemiology
(d) Ecological epidemiology

9. Best study of first choice for assessment of UNKNOWN or New disease with no etiological hypothesis?
(a) Cohort study *[MH 2007]*
(b) Case control study
(c) Cross-sectional study
(d) Descriptive epidemiology

MEASUREMENTS IN EPIDEMIOLOGY

10. The following is true about prevalence and incidence:
(a) Both are rates *[AIIMS Nov 03, AIIMS May 05]*
(b) Prevalence is a rate but incidence is not
(c) Incidence is a rate but prevalence is not
(d) Both are not rates

11. Prevalence is a: *[Recent Question 2013]*
(a) Rate
(b) Ratio
(c) Proportion
(d) Mean

12. Incidence of a disease in a population of 30,000 and 300 new cases is: *[DNB December 2011]*
(a) 0.1 per 1000
(b) 10 per 1000
(c) 100 per 1000
(d) 1 per 1000

13. For calculation of incidence denominator is taken as:
(a) Mid year population *[Recent Question 2012]*
(b) Population at risk
(c) Total number of cases
(d) Total number of deaths

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Review Questions

14. All of the following are true regarding the Ratio *except*: *[AP 2001]*
(a) Numerator is component of denominator
(b) Numerator is not a component of denominator
(c) Numerator & denominator are not related values
(d) It is expressed as a number

15. True about prevalence: *[MP 2002]*
(a) It is a ratio
(b) Prevalence rate is the ideal measure for studying disease etiology or causation
(c) Increases with increase in duration of disease
(d) Decreases with decrease in case fatality

IDC

16. In WHO recommended Death Certificate, Main Underlying Cause of Death is recorded on:
(a) Line Ia *[AIIMS Nov 1999]*
(b) Line Ib
(c) Line Ic
(d) Line II

MORTALITY MEASUREMENTS

17. All are true for Standardized Mortality ratio (SMR) *except*: *[AIIMS Nov 1992]*
(a) Is a form of direct standardization
(b) Is calculated as Observed deaths/ Expected deaths × 100
(c) Permits adjustment for age
(d) Can be used for disease as event of occurrence

18. Following can be used as a yardstick for the assessment of standards of therapy:
(a) Specific death rate *[AIPGME 1996]*
(b) Case fatality rate
(c) Proportional mortality rate
(d) Survival rate

19. About direct standardization all are true *except*: *[AIPGME 00, 02]*
(a) Age specific death rate is not needed *[UP 2002]*
(b) A standard population is needed
(c) Population should be comparable
(d) Two populations are compared

20. The rate adjusted to allow for the age distribution of the population is: *[AIIMS Nov 03, AIIMS May 05]*
(a) Perinatal mortality rate
(b) Crude mortality rate
(c) Fertility rate
(d) Age-standardized mortality rate

21. Which is best in order to make a comparison between 2 populations? *[AIIMS Nov 2001]*
(a) Standardized mortality rate
(b) Disease specific death rate
(c) Proportional mortality rate
(d) Age specific death rate

22. At what point in time is the population assessed for calculation of the crude death rate? *[AIIMS May 01]*
(a) 1st Jan
(b) 1st May
(c) 1st July
(d) 31st Dec

23. All are indicators of mortality except:
(a) Case fatality rate *[AIIMS May 1994]*
(b) Life expectancy
(c) Duration of sickness
(d) Standardised death rate

24. In an outbreak of cholera in a village of 2000 population 20 cases have occurred and 5 have died. Case fatality rate is: *[AIPGME 1991]*
(a) 1%
(b) 0.25%
(c) 5%
(d) 25%

25. All the statements are true about standardization except: *[AIPGME 2006, AIIMS June 2000]*
(a) Standardization allows comparison to be made between two different populations
(b) The national population is always taken as the standard population
(c) For direct Standardization, age specific rates of the study population are applied to that of the standard population
(d) For Indirect Standardization age specific rates of the standard population are applied to the study population

26. Direct standardization is used to compare the mortality rates between two countries. This is done because of the differences in: *[AIIMS Nov, May 2006, AIPGME 2007]*
(a) Causes of death
(b) Numerators
(c) Age distributions
(d) Denominators

27. Which one of the following is a better indicator of the severity of an acute disease? *[AIIMS May 1995, 04, AIPGME 2005, AIIMS Nov 1999]*
(a) Cause specific death rate
(b) Case fatality rate
(c) Standardized mortality ratio
(d) Five year survival rate

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28. Maximum power of destruction of a disease is measured by: *[DPG 2006]*
(a) Survival rate
(b) Case fatality rate
(c) Specific death rate
(d) Proportional mortality rate

29. Estimating the burden of particular disease in a community is measured by: *[Karnataka 2005]*
(a) Proportional mortality rate *[UP 2007]*
(b) Disease specific mortality
(c) Crude death rate
(d) Incidence of disease

30. Case fatality rate is a method measuring:
(a) Infectivity *[Karnataka 2005]*
(b) Pathogenicity
(c) Virulence
(d) Average duration of disease

31. Which one is not true of case fatality rate?
(a) It is a ratio *[Karnataka 2006]*
(b) Time interval is non-specified
(c) It may vary from the same disease in different epidemics
(d) It is useful in chronic diseases

32. The usefulness for "Case Fatality Rate" is very limited in: *[Karnataka 2009]*
(a) Sub-acute illness
(b) Acute illness
(c) Chronic illness
(d) All of the above

33. Direct standardisation is used to compare the mortality rates between two countries. This is done because of differences in: *[AIIMS May 2010]*
(a) Causes of death
(b) Numerators
(c) Age distribution
(d) Denominators

34. Most useful parameter to predict the virulence of acute illness is: *[AIPGME 2011]*
(a) Standardised mortality ratio (SMR)
(b) Case fatality rate (CFR)
(c) Secondary attack rate (SAR)
(d) Incidence

35. Standardised mortality rate is standardised for:
(a) Age *[DPG 2011]*
(b) Disease
(c) Region
(d) A particular time period

36. Direct standardization is used to compare mortality rates between 2 countries. This is done because there are differences in: *[AIIMS November 2011]*
(a) Causes of death
(b) Age distributions
(c) Numerators
(d) Denominators

37. Proportional mortality rate is: *[Recent Question 2012]*
(a) Rate
(b) Ratio
(c) Proportion
(d) None

38. Denominator for calculating proportional mortality rate from a specific disease is *[UPSC CMS 2015]*
(a) Mid-year population during that year
(b) Population at risk in that particular area
(c) Total deaths in that year
(d) Attributable deaths of a particular disease

39. Age specific death rates can be used for all of the following *except*: *[AIIMS November 2015]*
(a) Identify specific age groups at risk for preventive action
(b) Comparison for different causes within same population
(c) Comparison between different sexes in relation to injuries/accidents
(d) Comparison between different age groups in relation to injuries/accidents

Review Questions

40. Sullivan's Index: *[DNB 2008]*
(a) Measures disability
(b) Measures life years adjusted with death
(c) Measures life expectancy free of disability
(d) Measures life expectancy

41. True statement regarding specific death rates:
(a) Specific for age and sex *[UP 2005]*
(b) Identify particular group or group "at risk for preventive action"
(c) Maybe cause or disease specific
(d) All of the above

42. Case fatality rate is: *[AIIMS 1997] [MP 2001]*
(a) Speading power of a disease *[AP 2001]*
(b) Killing power of a disease in a time
(c) Killing power of a disease with no time interval
(d) Resistance of disease

43. Severity of the disease best assessed by:
(a) Disease specific mortality rate
(b) Crude death rate *[Kolkata 2003]*
(c) Age specific mortality rate
(d) Case fatality rate

44. Case fatality rate indicates: *[MP 2001, AP 2014]*
(a) Infectivity of disease *[MH 2002]*
(b) Herd immunity of disease in community
(c) Killing power of disease
(d) Relative importance of disease in community

45. Sullivan index is the measure of: *[MH 2000]*
(a) Disability rate
(b) Pregnancy rate
(c) GNP
(d) Literacy rate

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46. Health status of two populations is best compared by:
(a) Standardized mortality *[RJ 2001]*
(b) Case fatality rate
(c) Survival rate
(d) Secondary attack rate

MORBIDITY MEASUREMENTS

47. If a new effective treatment is initiated and all other factors remain the same; which of the following is most likely to happen: *[AIIMS May 04]*
(a) Incidence will not change
(b) Prevalence will not change
(c) Neither incidence nor prevalence will change
(d) Incidence and prevalence will change

48. Improved prevention of an acute, nonfatal disease is likely to: *[AIPGME 1996]*
(a) Decrease the prevalence of the disease
(b) Increase the prevalence of the disease
(c) Decrease the incidence of the disease
(d) Increase the incidence of the disease

49. A diagnostic test has been introduced that will detect a certain disease 1 yrs earlier than it is usually detected. Which of the following is most likely to happen to the disease within the 10 yrs after the test its introduced ? (Assumed that early detection has no effect on the natural history of the disease. Also assume that no changes in death certification practices occur during the 10yrs.): *[AIPGME 1998]*
(a) The period prevalence rate will decrease
(b) The apparent 5 yr survival rate will increase
(c) The age adjusted mortality rate will decrease
(d) The incidence rate will decrease

50. If the prevalence is very low as compared to the incidence for a disease, it implies: *[AIIMS Nov 03, AIIMS May 05]*
(a) Disease is very fatal and /or easily curable
(b) Disease is non-fatal
(c) Calculation of prevalence & incidence is wrong
(d) Nothing can be said, as they are independent

51. The incidence rate of a disease is 5 times greater in women than in men, but the prevalence rates show no sex difference. The best explanation is that: *[AIIMS June 1999]*
(a) The case fatality rate for this disease is lower in women
(b) The case fatality rate for this disease is higher for women
(c) The duration of disease is shorter in men
(d) Risk factors for developing the disease are more common in women

52. Prevalence of a disease: *[AIIMS Nov 2002]*
(a) Is the best measure of disease frequency in etiological studies
(b) Can only be determined by a cohort study
(c) Is the number of new cases in a defined population
(d) Describes the balance between incidence, mortality and recovery

53. In a village having population of 1000, we found patients with certain disease. The results of as new diagnostic test on that disease are as follows:

Test result	Disease	
	Present	Absent
+	180	400
–	20	400

What is the percent prevalence of disease?
(a) 0.20
(b) 2 *[AIPGME 2005]*
(c) 18
(d) 20

54. Measurement of incidence rate of a disease includes:
(a) Number of new cases *[Karnataka 2005]*
(b) Number of new and old cases
(c) Only notified cases
(d) Whole population

55. Incidence rate refers to: *[Karnataka 2004]*
(a) Only old cases (b) Both old and new cases
(c) Only new cases (d) None of the above

56. The relationship between incidence and prevalence can be expresses as: *[Karnataka 2005]*
(a) The product of incidence and mean duration of disease
(b) The dividend of incidence and mean duration of disease
(c) The sum of incidence and mean duration of disease
(d) The difference of incidence of mean duration of disease

57. Prevalence of cataract at one point of time can be determined by: *[AIIMS May 2009]*
(a) Longitudinal study
(b) Cross-sectional study
(c) Surveillance
(d) Cohort study

58. A district has total population 10 lacs, with under-16 population being 30%. The prevalence of blindness is 0.8/1000 among under-16 population. Calculate total number of blind among under-16 population in the district. *[AIIMS November 2012]*
(a) 240
(b) 2400
(c) 24000
(d) 240000

59. In a town of population 5000, 500 are already myopic on January 1, 2011. Number of new myopia cases is 90 till December 31, 2011. Calculate incidence of Myopia in the town in 2011. *[AIIMS November 2012]*
(a) 0.018
(b) 0.02

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(c) 0.05
(d) 18

60. All about incidence are false *except*: *[Recent Question 2012]*
(a) No affected by duration
(b) More than prevalence
(c) Measures old and new cases
(d) Used for chronic conditions

61. In a population of 5000 number of new cases of TB is 500; old cases in the same population are 150. What is the prevalence of TB *[Recent Question 2014]*
(a) 9%
(b) 12%
(c) 13%
(d) 18%

62. Which of the following is a better indicator of efficacy of hospital services and health programs? *[Recent Question 2015]*
(a) Case fatality rate
(b) Prevalence
(c) Secondary attack rate
(d) Incidence

63. When the prevalence rate is used without any qualification, it is taken to mean as? *[UPSC CMS 2015]*
(a) Point prevalence rate
(b) Period prevalence rate
(c) Annual prevalence rate
(d) Mean duration prevalence rate

64. A drug which reduces mortality but does not cure a disease, will gradually lead to *[AIIMS November 2015]*
(a) Incidence and prevalence both increase
(b) Incidence and prevalence both decrease
(c) Incidence increases while prevalence decreases
(d) Incidence same, prevalence increases

Review Questions

65. Attack rate is: *[MP 2001] [TN 1998] [AP 2000]*
(a) Incidence of the disease *[MP 2001]*
(b) Prevalence of the disease
(c) Killing power of the disease
(d) Incubation period of the disease

66. Incidence rate is calculated from: *[AP 2007]*
(a) Case-control
(b) Prospective study
(c) Retrospective study
(d) RCT

67. Incidence rate can be calculated from:
(a) Cohort study *[Kolkata 2005]*
(b) Case control study
(c) Cross sectional study
(d) Descriptive study

68. The secondary attack rate of measles is more than mumps. What is the conclusion? *[MH 2006]*
(a) Measles is more dangerous than mumps
(b) Mumps is more dangerous than measles
(c) Measles is more infectious than mumps
(d) Measles is more common than mumps

69. Which one of the following is an Index of communicability of an Infection? *[RJ 2007]*
(a) Carrier rate
(b) Prevalence rate
(c) Secondary attack rate
(d) Primary attack rate

70. High prevalence associated with: *[RJ 2008]*
(a) High cure rate
(b) Immigration of healthy people
(c) longer duration of disease
(d) Less Incidence of disease

DESCRIPTIVE EPIDEMIOLOGY

71. Changes in occurrence of a disease over long periods of time are known as: *[AIPGME 1994]*
(a) Epidemics
(b) Seasonal trends
(c) Cyclical trends
(d) Secular trends

72. All are true for Point source epidemic *except*:
(a) Epidemic curve rises and falls sharply
(b) Clustering of cases within a short period of time
(c) Person-to-person transmission
(d) All cases usually develop within one incubation period *[JIPMER 2014] [AIIMS Nov 06]*

73. True regarding point source epidemic is: *[AIIMS Sep 1996] [AIPGME 2000]*
(a) Secondary waves occur
(b) There is a rapid rise in the wave which flattens (Plateau)
(c) All cases occur in a single incubation period of the disease
(d) It is propagative

74. Regarding point source epidemic true:
(a) Rapid rise & fall *[PGI Dec 08]*
(b) Only infectious cause *[PGI June 02]*
(c) Explosive
(d) ↑secondary attack rate
(e) No secondary wave

75. Secular trend refers to: *[PGI June 2005]*
(a) Long term changes
(b) Short term changes
(c) Seasonal changes
(d) Periodical changes
(e) Religion changes

76. Secular trends are: *[DNB June 2009]*
(a) Progressive changes occurring over a long period of time
(b) Explosion of changes in a limited span of time
(c) Periodic changes occurring over a long period
(d) Sudden epidemic of a new occurring

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77. Twenty pregnant women were asked about the history of smoking when they came for regular antenatal visit and then followed up to see how many of them had Low birth weight babies. What is the type of study? *[Recent Question 2014]*
(a) Case control
(b) Prospective cohort
(c) Cross sectional
(d) Ecological

78. Migration study is used to study *[Recent Question 2015]*
(a) Sociodemographic reasons for migration of a population
(b) Prevalence of disease in a population
(c) Environmental and genetic factors in a disease in population
(d) Diseases with Long Incubation period

79. An outbreak of Viral hepatitis A was reported from a town between June and August of a particular year. Of total cases, 60% occurred in July. Exposure of the community to infection is from *[UPSC CMS 2015]*
(a) Common single source for a short period
(b) Common single source for a prolonged period
(c) Multiple sources for a short period
(d) Multiple sources for a prolonged period

Review Questions

80. Bhopal gas tragedy is an example of ?
(a) Point source epidemic *[DNB 2008]*
(b) Continuous epidemic
(c) Propagated epidemic
(d) Slow epidemic

81. Seasonal trend is: *[UP 2002]*
(a) Seasonal variation of disease occurrence may be related to environmental conditions
(b) Some diseases occurs in cyclic spread over short periods of time
(c) Some disease occurs in cyclic changes over long period of time
(d) Non-infectious conditions never show periodic fluctuations

82. Descriptive epidemiology includes all *except*:
(a) Retrospective and prospective study
(b) Disease *[UP 2003]*
(c) Time
(d) Place

83. A graph shows an uniform curve with no secondary curves the following statement is correct: *[AP 2000]*
(a) Multiple exposure
(b) Pointed epidemic
(c) Sporadic
(d) Pandemic

84. All are true about Point source epidemic *except*:
(a) Secondary Waves are not seen *[AP 2008]*
(b) All the cases occur simultaneously
(c) Plateau is seen
(d) None

85. Food poisoning is an example of: *[TN 2005]*
(a) Common source, single exposure epidemic
(b) Common source, continuous exposure epidemic
(c) Propagated epidemic
(d) Modern epidemic

86. About secular trend, true is: *[MP 2000]*
(a) Changes are seen periodically
(b) Affected by environmental conditions
(c) Changes occurs over decades in particular direction
(d) Vector dynamics is important

87. Rapid rise and fall in epidemic curve without any secondary waves is seen in: *[MP 2001]*
(a) Point source epidemic, single exposure
(b) Propagated epidemic
(c) Point source multiple exposure epidemic
(d) Seasonal trend

88. Secular trend of disease refers to occurrence of:
(a) Annual disease cycles *[MP 2007]*
(b) Bi-annual disease cycles
(c) 10 years or more disease cycles
(d) Consistent change in one direction

89. Disease occurs in cycles over short period of time:
(a) Seasonal trend *[RJ 2002]*
(b) Cyclic trend
(c) Secular trend
(d) All

ANALYTICAL EPIDEMIOLOGY

90. All of the following help reduce bias *except*:
(a) Blinding *[AIPGME 1996]*
(b) Randomization
(c) Ethical considerations
(d) Matching

91. The systematic distortion of retrospective studies that can be eliminated by a prospective design is:
(a) Confounding *[AIIMS May 04]*
(b) Effect modification
(c) Recall bias
(d) Measurement bias

92. The ratio between the incidence of disease among exposed and non-exposed is called:
(a) Causal risk *[AIIMS Nov 1993]*
(b) Relative risk
(c) Attributable risk
(d) Odds ratio

93. Hawthorne effect is seen in: *[AIPGME 1996]*
(a) Case-control study
(b) Cohort study
(c) Cross-sectional study
(d) Retrospective cohort study

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94. A study compared 150 children with a particular disease with 300 disease free children to examine past experiences that may contribute to the development of the illness. What kind of study is this ? *[AIPGME 2002]*
(a) Cohort
(b) Controlled clinical trial
(c) Case series
(d) Case control

95. Which of the following is not a cause of bias?
(a) Confounding *[AIPGME 1993]*
(b) Selection
(c) Misclassification
(d) Random error

96. The table given below shows cases of breast cancer occurring in a randomized clinical trial of a new drug designed to prevent the disease. In this study, 1000 healthy women between the ages of 60 and 65 were given the drug and 1000 were given the placebo for 5 years. *[AIIMS Sep 1996]*

	Breast Cancer	No Breast Cancer	Total
Placebo	40	960	1000
New Drug	10	990	1000

What is the relative risk of breast cancer in patients exposed to drug?
(a) 25%
(b) 50%
(c) 75%
(d) 100%

97. A study began in 1970 with a group of 5000 adults in Delhi who were asked about their alcohol consumption. The occurrence of cancer was studied in this group between 1990–1995. This is an example of: *[AIPGME 2000]*
(a) Cross-sectional study
(b) Retrospective cohort study
(c) Concurrent cohort study
(d) Case-control study

98. TATA memorial hospital conducted a cohort study on 7000 subjects who were smokers over a ten-year period & found 70 subjects developed lung cancer. Concurrent evaluation of general population in the catchment area of hospital, out of 7000 non-smoker subjects only 7 developed lung cancer. The RR for developing lung cancer is: *[AIPGME 1996]*
(a) 1
(b) 10
(c) 100
(d) 0.1

99. In an investigation to study the effect of smoking on renal cell cancer, it is observed that 30 of the 50 patients were smokers as compared to 10 out of 50 control subjects. The odd ratio of renal cancer associated with smoking will be:
(a) 3.0 *[AIIMS Nov 05]*
(b) 0.33
(c) 6.0
(d) 0.16

100. Matching is done for removal of: *[AIIMS Nov 2004]*
(a) Bias
(b) Known confounding
(c) Unknown confounding
(d) Known confounding + Unknown confounding

101. In a study of 200 smokers & 300 non-smokers were followed up over a period of 10 years to find out incidence of hypertension. Out of 200 smokers, 60 developed hypertension, as compared to 600 non-smokers of which 30 developed hypertension. The risk ratio of the study: *[AIIMS Nov 2001]*
(a) 3
(b) 30
(c) 1/3
(d) 6

102. In a study begun in 1965, a group of 3000 adults in Baltimore were asked about alcohol consumption. The occurrence of cancer was studied in the group between 1981 and 1995. This is an example of: *[AIPGME 2004]*
(a) Cross sectional study
(b) Concurrent cohort
(c) Retrospective cohort
(d) Clinical trial

103. The physical examination records of the entire incoming freshman class of 1935 at the University of Minnesota were examined in 1977 to see if their recorded height and weight at the time of admission to university was related to their chance of developing CHD. This is an example of:
(a) Cross sectional study *[AIIMS Dec 1997]*
(b) Concurrent cohort
(c) Retrospective cohort
(d) Clinical trial

104. Retrospective cohort studies are characterized by all the following *except*: *[AIIMS May 1995]*
(a) The study groups are exposed and non-exposed
(b) Incidence rates are compared
(c) The required sample size is smaller than that needed for a concurrent cohort study
(d) The required sample size is similar to that needed for a concurrent cohort study

105. At an initial examination in Oxford, Migraine head ache was found in 5 of 1000 men aged 30–35 years and in 10 of 1000 women aged 30 to 35 years. The inference that women have a two times greater risk of developing migraine headache than men in this age group is:
(a) Correct *[AIIMS Feb 1997]*
(b) Incorrect, because a ratio has been used to compare male and female rates

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(c) Incorrect, because of failure to recognize the cohort effect of age in the two groups
(d) Incorrect, because of failure to distinguish between incidence and prevalence

106. All the following are advantages of case control studies *except*: *[Recent Question 2013] [AIPGME 1996- 02]*
(a) Useful in rare diseases *[AIIMS June 2000]*
(b) Relative risk can be calculated
(c) Odds ratio can be calculated
(d) Cost-effective and inexpensive

107. A one day census of inpatients in a mental hospital could: *[AIIMS May 2005]*
(a) Give good information about the patients in that hospital at that time
(b) Give reliable estimates of seasonal factors in admissions
(c) Enable us to draw conclusions about the mental hospitals of India
(d) Enable us to estimate the distribution of different diagnosis in mental illness in the local area

108. The incidence of carcinoma cervix in women with multiple sexual partners is 5 times the incidence seen in those with a single partner. Based on this, what is the attributable risk? *[AIIMS May 2001]*
(a) 20% (b) 40%
(c) 50% (d) 80%

109. In a study 400 smokers and 600 non-smokers were followed up over a period of 10 years to find out the incidence of hypertension. The following table summarizes the data at the end of the study:

		Hypertension		
		Yes	No	Total
Smoking	**Yes**	120	280	400
	No	30	570	600
	Total	150	850	1000

The risk ratio in this study is: *[AIIMS Nov 05]*
(a) 0.06
(b) 0.60
(c) 6.0
(d) 60.0

110. Several studies have shown that 85% of cases of lung cancer are due to cigarette smoking. It is a measure of:
(a) Incidence rate *[AIIMS Nov 05, AIPGME 07]*
(b) Relative risk
(c) Attributable risk
(d) Population attributable risk

111. It is probable that physician have a higher index of suspicion for tuberculosis in children without BCG scar than those with BCG scar. This is so and an association is found between Tuberculosis and not having BCG scar, the association may be due to: *[AIIMS Nov 2005]*
(a) Selection bias
(b) Interviewer bias
(c) Surveillance bias
(d) Non-response bias

112. To investigate effect of tobacco chewed on oral cancer, its observed that 30 out of 50 patients were tobacco chewers as compared to 10 tobacco chewers out of 50 control subjects. The odds ratio of oral cancer associated with smoking will be:
(a) 6.0 *[AIIMS June 1998]*
(b) 60
(c) 3.0
(d) Insufficient data given for calculation

113. Framingham Heart Study is an example of:
(a) Case control study *[AIIMS Sep 1996]*
(b) Cohort study *[PGMCET 2015]*
(c) Cross-sectional study
(d) Interventional study

114. Which of the following statements is not correct? *[AIIMS Nov 2001] [AIPGME 1994]*
(a) A cohort study is more expensive in comparison to case control study
(b) A cohort study starts with people exposed to risk factor or suspected cause while case control study starts with disease
(c) A long follow-up period often needed with delayed results in a cohort study whereas a case control study yields relatively quick results
(d) A cohort study is more appropriate when the disease or exposure under investigation is rare, in comparison to case control study

115. For a community physician which of the following is more important? *[AIIMS June 1998]*
(a) Relative risk
(b) Odds ratio
(c) Attributable risk
(d) Prevalence of the disease

116. Which of the following research methods studies have only people who are initially free of the disease of interest ? *[AIIMS Dec 1994]*
(a) A case – control study
(b) A case series study
(c) A prevalence survey
(d) A cohort study

117. False about Odds Ratio is : *[AIIMS Nov 1993]*
(a) It is always positive
(b) It can be 0.3
(c) It can be 3.0
(d) It is always >1

118. An Odds ratio = 1 indicates that the association between the two factors is: *[AIIMS June 1992]*
(a) Is perfect (b) Is low
(c) Is high (d) Does not exist

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119. Which of the following bias can be reduced by allowing equal interview time? *[AIPGME 08]*
(a) Berkesonian bias
(b) Recall bias
(c) Selection bias
(d) Interviewer bias

120. Which of the following is ideal to ensure similarity between experimental & control groups:
(a) Randomization *[AIIMS May 2001]*
(b) Matching
(c) Stratified randomization
(d) Cross over study

121. All can be used as controls in a study of genetic condition *except*: *[AIPGME 1998]*
(a) Hospital Controls
(b) Sibling Controls
(c) Neighbourhood Controls
(d) General Population

122. True about case control studies is: *[AIIMS Nov 95]*
(a) Minimal problems of bias *[AIPGME 1994]*
(b) Time consuming & expensive to carry out
(c) Easy to measure incidence
(d) Suitable to investigate rare diseases

123. A study was carried out to find out safety of OCPs. Relative risk (or Odds Ratio) of thromboembolism among OCP users to non-users in the given case control study is:

	Number	%who used OCPs
Cases of thromboembolism	84	50
Controls	168	14

(a) 0.14 *[AIPGME 1996]*
(b) 6
(c) 1
(d) Insufficient data to calculate

124. Incidence rate of lung cancer among smokers is 10 per 1000 and among Non-smokers is 1 per 1000. The extent to which lung cancer can be attributed to smoking is:
(a) 10% *[AIIMS June 1997]*
(b) 90%
(c) 1%
(d) 100%

125. All of the following have individuals as unit of study *except*: *[AIIMS Nov 04]*
(a) Cohort studies
(b) Case control studies
(c) Cross-sectional studies
(d) Ecological studies

126. Match the following: *[AIIMS Nov 1993]*

Type of study	Unit of study
A. Cohort study	I. Healthy volunteers
B. Ecological study	II. Population
C. RCT	III. Individual
D. Field trials	IV. Patient

(a) A – I, B – III, C – IV, D – II
(b) A – III, B – II, C – IV, D – I
(c) A – III, B – II, C – I, D – IV
(d) A – I, B – III, C – II, D – IV

127. In a case-control study of a suspected association between breast cancer and the contraceptive pill, all of the following are true statements *except*: *[AIIMS Nov 2002]*
(a) The control should come from a population that has the same potential for breast cancer as the cases
(b) The control should exclude women known to be taking the pill at the time of the survey
(c) All the controls need to be healthy
(d) The attributable risk of breast cancer resulting from the pill may be directly measured

128. Which of the following statements is not true about 'cohort study'? *[AIIMS Nov 95, AIIMS Dec 94]*
(a) Provides incidence of disease
(b) Indicated when there is good evidence of association between exposure and disease
(c) Done when incidence of disease is very low among exposed
(d) Done when ample funds are available

129. The association between coronary artery disease (CAD) and smoking was found to be as follows:

	CAD	No CAD
Smokers	30	20
Nonsmokers	20	30

The Odds ratio can be estimated as: *[AIPGME 02]*
(a) 0.65 (b) 0.8
(c) 1.3 (d) 2.25

130. In a prospective study comprising 10000 subjects, 6000 subjects were put on beta carotene and 4000 were not. 3 out of the first 6000 developed lung cancer and 2 out of the second 4000 developed lung cancer. What is the interpretation of the above?
(a) Beta carotene is protective in lung cancer
(b) Beta carotene is not protective in lung cancer
(c) The study design is not sufficient to draw any meaningful conclusions *[AIPGME 01, 02]*
(d) Beta carotene is carcinogenic

131. Relative risk is the measure of the strength of the association between the suspected cause & event. Relative risk of one indicates:

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(a) Positive association exposure & disease
(b) 2 times high association *[AIIMS Dec 1991]*
(c) No association at all
(d) 4 times higher association

132. Relative risk of a disease measures the
(a) Strength of association between suspected cause and effect *[Karnataka 2005, 2008]*
(b) Biological plausibility between suspected cause and effect
(c) Temporal relationship between suspected cause and effect
(d) Specificity of association between suspected cause and effect

133. The association between low birth weight and maternal smoking during pregnancy can be studied by obtaining smoking histories of women at the time of their visit and then subsequently correlating birth weight with smoking histories. What type of study is this?
(a) Clinical trial *[Karnataka 2007]*
(b) Cross-sectional
(c) Prospective
(d) Case-control

134. False about Randomised Control Trials is:
(a) Results of attrition are included in the analysis
(b) Randomisation is done while selecting subjects for the study *[AIPGME 1994]*
(c) Double blinding is the most common form of blinding observed
(d) Cross-over design helps removing ethical concerns

135. True about case control study is: *[PGI June 01]*
(a) Helpful for evaluation of rare diseas *[PGI 2005]*
(b) Expensive *[AP 1999, 2003]*
(c) Incidence can be measured
(d) Rare causes studied
(e) Selection bias common

136. True about case control study is: *[PGI Dec 07]*
(a) Proceeds from effect to cause
(b) Exposure already occurred
(c) Odd's ratio can be determined
(d) Incidence can be calculated
(e) Cases have to be followed for long time

137. True about confounding factor:
(a) It is found equally between the study and the control groups *[AIIMS May 2009]*
(b) It is itself a risk factor for the disease
(c) Confounding can be eliminated by selecting a small group
(d) It is associated either with the exposure or the disease

138. Nested case control study is a type of:
(a) Retrospective study *[AIIMS May 2009]*
(b) Prospective study
(c) Descriptive study
(d) Cross-sectional study

139. Recall bias is most commonly associated with which study design *[AIIMS Nov- 2009]*
(a) Case control study
(b) Cohort study
(c) Randomised controlled trial
(d) Cross-sectional study

140. Incidence can be calculated in: *[AIIMS May 2010]*
(a) Case-control study *[AIIMS May 2011]*
(b) Prospective study *[UP 2000, RJ 2000, 2001]*
(c) Retrospective study *[Kolkata 2005]*
(d) Cross-sectional study

141. Confounding bias is reduced by all *except*:
(a) Matching *[AIIMS Nov 2010]*
(b) Blinding *[AIIMS May 2012]*
(c) Randomisation
(d) Multivariate analysis

142. A person wants to study a disease 'X' and fat consumption. He collected data for a number of people affected with 'X' from the government hospital and details of fat consumption from food industry. This type of study is known as: *[AIIMS Nov 2010]*
(a) Experimental study
(b) Ecological study
(c) Pesiological study
(d) Cross-sectional study

143. A study revealed that in a study group, intake of beta-carotene decreases carcinoma of colon but it actually may be due to increased intake of dietary fibre. This is due to: *[AIIMS Nov 2010]*
(a) Confoundging factor
(b) Misclassification bias
(c) Randomisation
(d) Sampling error

144. Case control study is used for study of: *[DPG 2011]*
(a) Common diseases
(b) Uncommon diseases
(c) Rare diseases
(d) Unknown diseases

145. In a study, 400 smokers and 600 non-smokers were followed up over a period of 10 years to find out the incidence of hypertension. The following table summarises the data at the end of the study *[DPG 2011]*

		Hypertension		
		Yes	No	Total
Smoking	Yes	120	280	400
Non-Smoking	No	30	570	600
	Total	150	850	1000

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The risk ratio of the study is:
(a) 0.06
(b) 0.60
(c) 6.0
(d) 60.0

146. In a UK study, it was found that there were more deaths from Asthma than the sale of Anti-asthma drugs. This is an example of: *[AIIMS November 2011]*
(a) Cohort study
(b) Case reference study
(c) Ecological study
(d) Experimental study

147. Which of the following is not a true difference between Case control and Cohort study?
(a) Case control study requires more time than cohort study *[AIPGME 2012]*
(b) Cohorts are chosen based on exposure in a cohort study
(c) Cohort study is generally prospective in direction
(d) Case control study must be used for rare diseases

148. Case-control study is a type of: *[DNB 2008]*
(a) Descriptive epidemiological study
(b) Analytical study
(c) Longitudinal study
(d) Experimental epidemiological study

149. The analytical study where population is the unit of study is: *[DNB 2007]*
(a) Cross-sectional
(b) Ecological
(c) Case-control
(d) Cohort

150. Cross sectional study is: *[DNB December 2011]*
[Recent Questions 2014]
(a) Longitudinal study
(b) Prospective study
(c) Retrospective study
(d) Prevalence study

151. Which is not an analytical study? *[DNB June 2011]*
[DNB 2008]
(a) Case control
(b) Cohort study
(c) RCT
(d) Cross-sectional

152. In a study done to establish smoking as a risk factor for a disease, 30 out of 50 smokers developed the disease while 10 out of 50 non-smokers developed the disease. Odds ratio is? *[DNB December 2010]*
(a) 3 (b) 6
(c) 5 (d) 10

153. True about case control study is: *[Recent Question 2012, 2014]*
(a) Not possible for rare disease
(b) Odds ratio cannot be calculated
(c) Attributable risk cannot be calculated
(d) Bias is not seen

154. Features of Case control study is/are: *[PGI May 2013]*
(a) Useful for study of rare diseases
(b) Large sample size required
(c) Association measured by Relative risk
(d) Study multiple potential risk factors of a disease
(e) Higher accuracy rate

155. A study revealed lesser incidence of carcinoma colon in pure vegetarians than non vegetarians by which it was concluded that beta-carotene is protective against cancer. This may not be true because the vegetarian subjects may be consuming high fibre diet which is protective against cancer. This is an example of:
(a) Multifactorial causation *[AIIMS May 2012]*
(b) Causal association
(c) Confounding factor
(d) Common association

156. Berksonian bias is a type of:
[Recent Question 2012] [Recent Question 2013]
(a) Selection bias
(b) Interviewer bias
(c) Information bias
(d) Recall bias

157. A person found some correlation between fatty food intake and a disease due to obesity. He did this by collecting data from the food manufacturers and hospitals respectively. Such a study is?
(a) Ecological study *[AIIMS May 2012]*
(b) Cross-sectional study
(c) Psephological study
(d) Experimental study

158. Confounding can be removed by: *[DNB June 2011]*
(a) Assign confounders equally to both cases and controls
(b) Stratification
(c) Matching
(d) All of the above

159. Relative risk is calculated in: *[Recent Question 2013]*
(a) Cross-sectional study
(b) Cohort study
(c) Case control study
(d) None

160. Attributable risk means: *[Recent Question 2012]*
(a) Fatality of a disease
(b) Disease risk ratio between exposed and non-exposed
(c) Risk difference between exposed and non-exposed
(d) Communicability of a disease

161. Berksonian bias is due to: *[DNB December 2010]*
(a) Presence of confounding factors in both cases and controls
(b) Questioning the cases more thoroughly ac compared to controls
(c) Different rates of admission to hospital due to different diseases
(d) Better recall by the cases as compared to controls

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162. Which of the following is true about cohort study?
(a) Disease to risk factor study *[Recent Question 2014]*
(b) Effect to cause study
(c) NOT associated with attributable rsik
(d) Associated with antecedent causation

163. Definition of Population attributable risk
(a) Risk of disease among exposed as compared to non-exposed *[AIIMS November 2014]*
(b) Difference in risk of exposed and non-exposed groups
(c) Estimate of amount of disease that can be reduced if risk factor is modified/ eliminated
(d) Extent to which disease can be attributed to risk factor under study

164. Researcher wants to study the Blood levels of Lipids among people who smoke and those do not. But he is now concerned that the Smokers might differ from Non-smokers in their diet, exercise, etc. as well. This concern is known as: *[AIIMS May 2015]*
(a) Recall bias
(b) Information bias
(c) Hawthorne bias
(d) Selection bias

165. A study has been done to establish relationship between Smoking and Lung cancer. It was found that association was more in people who exercise less and less in people who exercise more. In this situation, Exercise is a *[AIIMS May 2015]*
(a) Bias
(b) Effect modifier
(c) Confounding factor
(d) Collinear factor

166. Analytical studies include the following methods of studies *except*: *[UPSC CMS 2015]*
(a) Case control studies
(b) Randomised controlled trials
(c) Cohort studies
(d) Cross-sectional studies

Review Questions

167. Following are true about cohort study except:
(a) Large number of subjects *[DNB 2002]*
(b) Expensive
(c) Done for rare cause
(d) Less time consuming

168. 'Relative risk' is: *[DNB 2004]*
(a) Risk among exposed/Risk among non-exposed
(b) Risk among exposed/Risk in total population
(c) Risk among exposed/Risk among exposed-Risk in non-exposed
(d) None of the above

169. The analytical study where population is the unit of study is: *[DNB 2007]*
(a) Cross-sectional
(b) Ecological
(c) Case-control
(d) Cohort

170. Which is not an analytical study? *[DNB 2008]*
(a) Case control study
(b) Cohort study
(c) Ecological studies
(d) Field trials

171. Case-control study is a type of ? *[DNB 2008]*
(a) Descriptive epidemiological study
(b) Analytical study
(c) Longtudinal study
(d) Experimental epidemiological study

172. Matching is done to remove: *[Bihar 2003]*
(a) Confounding factors
(b) Selection bias
(c) Observation bias
(d) Sampling error

173. Relative risk was studied for disease and cause, the value was 1. It implies : *[Bihar 2004]*
(a) No association
(b) Positive association
(c) Both
(d) None

174. Relative risk is: *[Bihar 2005]*
(a) No of persons diseased among Non-exposed/Incidence among exposed
(b) Incidence of Non-exposed/Incidence among exposed × 100
(c) Incidence among exposed/Incidence among Non-exposed × 100
(d) Incidence among exposed/Incidence among Non-exposed

175. Attriubutal risk is: *[Bihar 2006]*
(a) Incidence of disease among exposed-incidence of among nonexposed × 100/Incidence rate among exposed
(b) Incidence rate among exposed × 100/Incidence of disease among exposed – incidence of disease among nonexposed
(c) Incidence rate among exposed × 100 Incidence of disease among exposed
(d) Incidence of disease among nonexposed × 100/ Incidence rate among exposed

176. Cohort study does not include: *[UP 2003]*
(a) Expensive *[Recent Question 2015]*
(b) Study for chronic disease
(c) Incidence rate calculated
(d) Starts with the disease

177. Case control study- estimate: *[UP 2008]*
(a) Only odd's ratio
(b) Odds ratio and attributable risk
(c) Relative risk, attributable risk, population attributable risk
(d) Incidence, Relative risk, and attributable risk

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178. All are advantages of case control study *except*:
(a) Cheap and easy *[AP 2004]*
(b) Fast and effective
(c) No ethical problem and several factors identified
(d) Distinguishing between causes and associated factors

179. All are true regarding confounding factor except: *[AP 2006]*
(a) It is associated with exposure under investigation
(b) It is distributed equally in study & control groups
(c) It is associated both with exposure and disease
(d) It is removed by matching in case control study

180. Most appropriate method to know about contribution of risk factor to disease: *[AP 2007]*
(a) Relative risk
(b) Attributable risk
(c) Absolute risk
(d) Odds ratio

181. What is not true about cross-sectional study?
(a) Also called prevalence study *[AP 2008]*
(b) Tells etiology
(c) Shows pattern of disease
(d) Snapshot of a population

182. Odds' ratio is an estimate of: *[MP 2000]*
(a) Relative risk *[RJ 2006]*
(b) Attributable risk *[DNB 2009]*
(c) Prevalences
(d) Incidence rates

183. Regarding case control study true is: *[MP 2001]*
(a) Useful for rare diseases *[RJ 2000, JIPMER 2014]*
(b) Incidence can be calculated *[AP 2000]*
(c) Takes longer time *[Recent Question 2012]*
(d) Relative risk can be calculated

184. Case control studies do not provide following *except*:
(a) Attributable risk *[MP 2001]*
(b) Prevalence of disease
(c) Incidence of disease
(d) Odds ratio

185. Calculate the relative risk for a population in which incidence of disease among exposed is 20 and non-exposed is 4: *[MP 2002]*
(a) 16
(b) 0.5
(c) 24
(d) 5

186. Attribute risk gives a better idea of: *[MP 2007]*
(a) Strength of association between cause and effect
(b) Impact of successful preventive health programme
(c) Assessing aetiological role or factor in disease
(d) Potential public health importance of disease

187. Healthy worker effect is bias of which type?
(a) Selection bias *[MH 2003]*
(b) Recall bias
(c) Confounding bias
(d) Berksonian bias

188. True about cross-sectional epidemiological study is:
(a) Suitable for study of rare diseases
(b) Chronic diseases can be studied *[MH 2005]*
(c) Involves few number of subjects
(d) Relatively inexpensive study

189. Bias due to wrong interpretation of laboratory test results and inter-observer variation is:
(a) Selection bias *[MH 2005]*
(b) Sampling bias
(c) Observation bias
(d) Recall bias

190. Strength of association is most commonly indicated by: *[Karnataka 2003, MH 2005]*
(a) Relative risk
(b) Attributable risk
(c) Population attributable risk
(d) None

191. What is the odds ratio for the following?
(a) ad/bc *[MH 2006]*
(b) ab/cd
(c) ac/bd
(d) bc/ad

192. What will be the Odds ratio if the diseased with risk factor =a; diseased without risk factor=c; not diseased but with risk factor=b; a not diseased as well as not with risk factor=d?
(a) ad/bc *[MH-SS-ET 2007, MH 2008]*
(b) ab/cd
(c) ac/bd
(d) bc/ad

193. Attributable risk is measured by: *[RJ 2002]*
(a) Cohort study
(b) Case control study
(c) Cross-sectional study
(d) None

194. Cohort study is: *[RJ 2006]*
(a) Needs few patients
(b) Incidence can be calculated
(c) Proceeds from effect to cause
(d) Odd ratio can be calculated

195. Study of alcohol intake for 10 year and occurring of hepatic disease type of study is:
(a) Cohort *[RJ 2007]*
(b) Case control
(c) Random
(d) Cross-sectional

EXPERIMENTAL EPIDEMIOLOGY

196. In a double blind clinical drug trial:
(a) Each patient receives a placebo
(b) Each patient receives both (double) treatments
(c) The patients do not know which treatment they are receiving *[AIIMS Nov 03, AIPGME 06]*
(d) The patients do not know that they are in a drug trial

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197. All the following are true in a randomized control trial (RCT) *except*:
(a) Baseline characteristics of intervention are similar in both arms *[AIIMS Nov 2008] [AIPGME 2006]*
(b) Investigator's bias is minimized by double blinding
(c) The sample size required depends on the hypothesis
(d) The dropouts from the trial should be excluded from the analysis

198. What is the purpose of a control group in an experimental study? *[AIPGME 1997]*
(a) Its permits an ethical alternative for patients who do not wish to be subjected to an experimental treatment
(b) It allows larger numbers of patients to be used, thus increasing the power of the statistical techniques used
(c) It helps to eliminate alternative explanations for the results of the study
(d) It reduces the likelihood of making a type II error in hypothesis testing

199. What is the purpose of randomization in a clinical trial? *[AIPGME 2007]*
(a) To equalize the effects of extraneous variables, thus guarding against bias
(b) To allow inferential statistics to be used
(c) To guard against placebo effects
(d) To guard against ethical problems in the allocation of patients to experimental and control groups

200. A pharmaceutical company develops a new anti-hypertensive drug. Samples of 24 hypertensive patients, randomly selected from a large population of hypertensive people, are randomly divided into 2 groups of 12. One group is given the new drug over a period of 1 month; the other group is given a placebo according to the same schedule. Neither the patients nor the treating physicians are aware of which patients are in which group. At the end of the month, measurements are made of the patient's blood pressures. This study:
(a) Is a randomized controlled clinical trial
(b) Uses a crossover design *[AIIMS Nov 2000]*
(c) Is a single blind experiment
(d) Is a prospective study

201. Intention-to-treat analysis is done in
(a) Cohort study *[AIPGME 2002]*
(b) Survival analysis studies
(c) Randomized control trials
(d) Multiple time series studies

202. Random in Randomization in a clinical trial means:
(a) Equal but unknown chance *[AIIMS Nov 1992]*
(b) Unequal and unknown chance
(c) Unequal but known chance
(d) Equal and known chance

203. The major purpose of random assignment in a clinical trial is to: *[AIPGME 1996]*
(a) Help ensure that study subjects are representative of the general population
(b) Facilitate double blinding
(c) Facilitate measurement of outcome variables
(d) Ensure that the study groups are comparable on base line characteristics

204. Which one of the following statements regarding pre-post clinical trial is most appropriate?
(a) They cannot be randomized *[AIIMS May 05]*
(b) They are useful in studies involving mortality
(c) They use the patient as his or her own control
(d) They are usually easier to interpret than the comparable parallel clinical trial

205. The heart of randomized controlled trail is
(a) Protocol *[Karnataka 2008]*
(b) Intervention
(c) Randomization
(d) None of the above

206. All of the following are Experimental/Interventional studies *except*: *[AIIMS Nov 2000]*
(a) Randomised control trials
(b) Field trials
(c) Community trials (d) Ecological studies

207. In a controlled trial to compare two treatments, the main purpose of randomization is to ensure that:
(a) The two groups will be similar in prognostic factors *[AIIMS Nov 2002]*
(b) The clinician does not know which treatment the subjects will receive
(c) The sample may be referred to a known population
(d) The clinician can predict in advance which treatment the subjects will receive

208. In a randomized controlled trial, the essential purpose of randomization is: *[AIPGME 06]*
(a) To produce double blinding
(b) To decrease the follow-up period
(c) To eliminate the selection bias
(d) To decrease the sample size

209. All are true about Experimental trials *except*:
(a) Can't double blind in animal trials
(b) All animal trials are unethical
(c) Can't do interim analysis
(d) Are always prospective

210. Efficacy of a new drug A is compared with an existing drug B in *[AIPGME 2012]*
(a) Clinical trial phase I
(b) Clinical trial phase II
(c) Clinical trial phase III
(d) Clinical trial phase IV

211. Gold standard study for Clinical research is
(a) Randomised double-blind trial
(b) Systematic meta-analysis
(c) Ecological study *[AIIMS November 2011]*
(d) Retrospective cohort study

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212. About RCT all are true *except*: *[AIIMS May 2011]*
(a) Baseline characteristics are comparable
(b) Bias eliminated by double blinding
(c) Sample size depends on type of study
(d) Dropouts are excluded from the study

213. Maximum tolerated dose of a new drug is evaluated in:
(a) Phase 1 *[AIIMS May 2013]*
(b) Phase 2
(c) Phase 3
(d) Phase 4

214. Selection bias can be eliminated by:
(a) Randomization *[DNB December 2011]*
(b) Single blinding
(c) Double blinding
(d) Matching

215. Maximum Rate of Drug failure is seen in …….. Phase of Clinical trial: *[Recent Question 2015]*
(a) 1
(b) 2
(c) 3
(d) 4

216. All are True regarding Meta-analysis except *[Recent Question 2015]*
(a) Statistical technique for combing the finding from several independent studies on special topic
(b) Its purpose is not to identify risk factors
(c) Its purpose is to increase statistical power by increasing the sample size
(d) The validity does not depend on quality of systemic review

217. Not a feature of Systematic Review? *[Recent Question 2015]*
(a) Meta-analysis always performed
(b) Search for literature is compulsory using explicit search strategy
(c) Critical appraisal is always criterion based
(d) Research question always focused

218. Following is NOT a benefit of Randomization? *[AIIMS November 2015]*
(a) Reduction of bias in selection of groups
(b) Ensure comparability of both groups
(c) Facilitates blinding of treatment
(d) Increases external validity of study

Review Questions

219. Randomized controlled trials are all *except*:
(a) Clinical trials *[DNB 2002]*
(b) Preventive trials
(c) Before and after comparison studies
(d) Evaluation of Health Services

220. In Randomized control trials, randomization is an attempt to eliminate: *[AP 2000]*
(a) Selection bias *[MP 2001]*
(b) Out come bias
(c) Uncontrolled trials
(d) Natural experiments

221. All of the following are true regarding RCT except: *[AP 2006]*
(a) Double binding is done to remove investigator bias
(b) Drop outs results are excluded from the study
(c) Randomizations is the heart of a control trial
(d) 1st step in RCT is drawing up a protocol

222. Double blind study means: *[RJ 2006]*
(a) Observer is blind about the study
(b) Person or group being observed is blind about the study
(c) Both observer and person or group being observed is blind about the study
(d) Interpreters and analyzer are blind about the study

ASSOCIATION AND CAUSATION

223. Most difficult criterion to establish Causal Association in aetiology of a disease is:
(a) Temporality *[AIPGME 2008]*
(b) Strength of association
(c) Specificity of association
(d) Biological plausibility

224. Which of the following studies is best for establishing causation? *[AIIMS Feb 1997]*
(a) Case-control study
(b) Cohort study
(c) Randomized control trials
(d) Case-series study

225. An advertisement in a medical journal stated that 2000 subjects with sore throat were treated with our new medicine. With in 4 days, 94% were asymptomatic. The advertisement claims that the medicine was effective. Based on the evidence given above, the claim:
(a) Is correct *[AIIMS June 1998]*
(b) May be incorrect as the conclusion is not based on a rate
(c) May be incorrect because of failure to recognize a long-term cohort effect
(d) Incorrect because as no control or comparison group was involved

226. To test the association between risk factor and disease, which of the following is the weakest study design?
(a) Case-control study *[AIIMS Nov 04]*
(b) Ecological study
(c) Cohort study
(d) Cross sectional study

227. Of the different epidemiological study designs available to test the association between risk factor and disease, the best design is of:
(a) Case-control study *[AIIMS Nov 2005]*
(b) Ecological study
(c) Cohort study
(d) Cross-sectional study

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228. **In establishing Causal Association, most essential criterion is:** *[AIIMS Nov 1999]*
(a) Consistency of relationship *[AIIMS June 1999]*
(b) Temporal relationship
(c) Duration of relationship
(d) Strength of relationship

229. **Suspected cause preceding the observed effect is an example for:** *[Recent Question 2012]*
(a) Coherence
(b) Temporality
(c) Biological plausibility
(d) Specificity

230. **Best study design used for Exposure and Outcome association is:** *[AIIMS November 2015]*
(a) RCT
(b) Cohort study
(c) Ecological
(d) Cross-sectional study

Review Questions

231. **Current smokers are at higher risk of developing lung cancer as compared to ex-smokers, criticality of casualty satisfied here is:** *[MH 2003]*
(a) Temporal relationship
(b) Consistency
(c) Strength of association
(d) Reversibility or reversible association

232. **Association of high altitude areas with goiter is example of:** *[MH 2007]*
(a) Causal association
(b) Direct association
(c) Temporal association
(d) Indirect association

EPIDEMIOLOGY OF INFECTIOUS DISEASES

233. **Infections transmitted to man from vertebrate animals are known as:** *[AIPGME 1995]*
(a) Exotic
(b) Anthropozoonoses
(c) Zooanthroponoses
(d) Epizootic

234. **'Endemic Disease' means that a disease:**
(a) Occurs clearly in excess of normal expectancy
(b) Is constantly present in a given population group *[AIPGME 05]*
(c) Exhibits seasonal pattern
(d) Is prevalent among animals

235. **Occurrence of a disease in a haphazard and irregular pattern is known as:** *[DPG 2004]*
(a) Endemic
(b) Epidemic
(c) Sporadic
(d) Pandemic

236. **HIV cases are reported from all over the world. This is called as** *[DPG 2007]*
(a) Endemic
(b) Epidemic
(c) Pandemic
(d) Sporadic

237. **Following is part of "Sentinel Surveillance" *except*:** *[Karnataka 2009]*
(a) Method for identifying the missing cases
(b) Supplementing the notified cases
(c) To estimate the disease prevalence in total population
(d) To estimate the fatality of the disease

238. **The ability of an infectious agent to invade and multiply in a host is called** *[Karnataka 2009]*
(a) Pathogenicity
(b) Infectivity
(c) Virulence
(d) Communicability

239. **Pandemics are caused by:** *[PGI Dec 2K]*
(a) Hepatitis B
(b) Influenza – A
(c) Influenza – B
(d) Influenza – C

240. **Post exposure vaccination is given in:**
(a) Typhoid *[Recent Question 2013]*
(b) Rabies
(c) Mumps
(d) Rubella

241. **Disease(s) infectious before onset of symptoms is/are:**
(a) Measles *[PGI May 2012]*
(b) Mumps
(c) Cholera
(d) Hepatitis B
(e) Poliomyelitis

Review Questions

242. **Hospital acquired infection of surgical wound is mostly by:** *[AP 2005]*
(a) Doctor
(b) Patient
(c) Air borne
(d) Instruments

243. **Subclinical infection is not seen in:** *[MP 2002]*
(a) Rabies
(b) AIDS
(c) Polio
(d) Hepatitis A

244. **Hospital Acquired infections are called as:**
(a) Emporiatric infections *[MP 2007]*
(b) Nosocomial infections
(c) Iatrogenic infections
(d) Epomithic infections

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245. Disease imported in a country, which was not otherwise present? *[MH 2007]*
(a) Epornithic disease
(b) Zoonotic disease
(c) Exotic disease
(d) Epizootic disease

DISEASE TRANSMISSION

246. Soil is an important reservoir for all except:
(a) Brucellosis *[AIPGME 2008]*
(b) Coccidiomycosis
(c) Anthrax
(d) Tetanus

247. The time taken for 50% of patients to develop the disease following exposure to the disease is known as: *[AIIMS June 1999]*
(a) Incubation period
(b) Median incubation period
(c) Generation time
(d) Secondary Attack rate

248. In a 6-membered family, there are two parents and four children all aged between 2–6 years. One of the children (3 years old) is completely immunized for his age, whereas other 3 siblings are totally unimmunised. On 12 August 2006, one of the latter got measles. 2 other siblings also got measles by 18 August 2006. Secondary attack rate is: *[AIIMS May 1995]*
(a) Zero
(b) 33%
(c) 66%
(d) 100%

249. A village has 100 under five children. The coverage of measles vaccine is 60%. Following a measles case 26 children developed measles. The secondary attack rate is: *[AIIMS May 1999]*
(a) 25%
(b) 40%
(c) 50%
(d) 65%

250. Generation time in epidemiology is defined as: *[AIIMS May 1995, DPG 2008, MP 2003, DNB 2011, Karnataka 2004, Recent Question 2013]*
(a) The interval between marriage and the birth of first child
(b) The interval of time between the receipt of infection by host and maximal infectivity of the host
(c) The interval of time between primary case and secondary cases
(d) Interval of time between invasion by infectious agent and appearance of first sign or symptom of the disease/in question

251. All of the following are used as proxy measures for incubation period in disease *except*:
(a) Latent period *[AIIMS Nov 1993 & Sep 1996]*
(b) Period of communicability *[DNB 2007]*
(c) Serial interval
(d) Generation time

252. A family consists of 2 parents & 6 children susceptible to measles. There occurs a primary case of measles and 3 secondary cases within a short period of time. Secondary attack rate is: *[AIIMS June 2000]*
(a) 60%
(b) 38%
(c) 67%
(d) 50%

253. Denominator while calculating the secondary attack rate includes: *[Bihar, 2004, AIPGME 03]*
(a) All the people living in next fifty houses
(b) All the close contacts
(c) All susceptibles amongst close contact
(d) All susceptibles in the whole village

254. Serial interval is: *[Karnataka 2009, Recent Question 2013, UPSC 1993, DPG 2005, AIPGME-2000- 02, AIIMS June 99 & 2000 May 02, DNB 2009, 2011, RJ 2002, 07, WB 2005]*
(a) Time gap between primary and secondary case
(b) Time gap between index and primary case
(c) Time taken for a person from receipt of infection to develop maximum infectivity
(d) The time taken from infection till a person infects another person

255. Which of the following is not spread by fomites?
(a) AIDS *[DPG 2007]*
(b) Typhoid
(c) Diarrhea
(d) Hepatitis A

256. The transmission of filariasis is an example of
(a) Propagative transmission *[Karnataka 2005]*
(b) Cyclical transmission
(c) Cyclo-developmental transmission
(d) Cyclo-propagative transmission

257. The following diseases are communicable during later part of incubation period *except*:
(a) Measles *[Karnataka 2009]*
(b) Whooping Cough
(c) Hepatitis A
(d) Typhoid

258. Which of the following statement about "Reservoir" of an infection is NOT correct? *[Karnataka 2009]*
(a) Reservoir can transmit infection to a susceptible host
(b) "Reservoir" and "Source" of infection are synonymous
(c) Non-living thing can be Reservoir
(d) Reservoir can be an animal

259. Which of the following statement about "Incubation Period" (IP) is NOT correct? *[Karnataka 2009]*
(a) It is the time interval between invasion by an infectious agent and appearance of the first sign or symptom

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(b) During IP, the infectious agent undergoes multiplication in the host
(c) The factors such as infective dose of pathogens and portal of entry determines IP
(d) Infectious disease are not communicable during IP

260. Which of the following does not have non human reservoirs *[PGI June 08]*
(a) Polio
(b) Pertussis (c) Salmonella Typhi
(d) Neisseria meningitidis (e) Cl. Teani

261. Disease highly transmitted during incubation period is/are: *[PGI June 08]*
(a) Pertussis
(b) Cholera
(c) Measles
(d) Brucellosis
(e) Chicken-pox

262. Incubatory carriers seen in: *[PGI June 08]*
(a) Cholera
(b) Bubonic plague
(c) Mumps
(d) Measles
(e) Influenza

263. Isolation is needed in which of the following diseases:
(a) Diptheria *[PGI Dec 06]*
(b) T.B. *[PGI 2007]*
(c) Cholera *[PGI 2012]*
(d) Herpes zoster
(e) Streptococcal pharyngitis

264. Isolation is advised in *[PGI June 06]*
(a) Polio
(b) Diphtheria
(c) Leprosy
(d) Pneumonic plague
(e) HIV

265. Carrier stage seen in: *[PGI June 05]*
(a) Polio
(b) Cholera
(c) Pertusis
(d) Plague
(e) Tetanus

266. Which of the following diseases have incubation period < 10 days: *[PGI June 06]*
(a) Cholera
(b) Influenza
(c) Plague
(d) Measles
(e) Rubella

267. Healthy carrier seen in: *[PGI Dec 04] [PGI 2003]*
(a) T.B.
(b) Diphtheria
(c) Cholera
(d) Typhoid
(e) Tetanus

268. Presence of infectious arthropod agent on clothes or dressing is termed *[Karnataka 2011]*
(a) Infection
(b) Infestation
(c) Contamination
(d) Contagion

269. Quarantine period should be: *[Recent Question 2012]*
(a) Minimum incubation period
(b) Maximum incubation period
(c) Period of communicability
(d) Median incubation period

270. First case that comes to notice of physician is:
(a) Primary case *[DNB June 2011]*
(b) Secondary case *[Recent Questions 2014]*
(c) Index case *[MP 2003]*
(d) Refer case

271. Application of incubation period is all except: *[AIIMS May 2012]*
(a) To differentiate primary case from secondary cases
(b) To find out time for isolation
(c) To find out time for quarantine
(d) To prevent infection to the contacts of the infected person

272. Chronic carrier state is seen in: *[Recent Question 2013]*
(a) Poliomyelitis
(b) Measles
(c) Malaria
(d) Tetanus

273. All of the following are correct regarding Period of isolation *except*: *[AIIMS May 2014]*
(a) Measles – Upto 3 days of onset of rash
(b) Chicken pox – Upto 6 days of onset of rash
(c) Herpes zoster – Upto 6 days of onset of rash
(d) Rubella – Until 7 days after appearance of rash

274. Window period is defined as time taken from *[AIIMS PG May 2015]*
(a) Entry in cell to expulsion of first viral particle
(b) Entry of pathogen to appearance of first clinical symptom
(c) Exposure to laboratory detection of disease
(d) Entry of organism to maximum communicability

Review Questions

275. Man is dead end for: *[DNB 2006] [Bihar 2003]*
(a) Tetanus, measles
(b) Measles, yellow fever
(c) Tetanus, yellow fever
(d) Rabies, tetanus

276. Which of the following carriers excrete infectious agents for indefinite periods: *[UP 2007]*
(a) Incubatory carrier
(b) Convalescent carrier
(c) Healthy carrier
(d) Chronic carrier

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277. **Vertical transmission is seen in :** *[UP 2007]*
(a) Herpes simplex
(b) Leprosy
(c) Tetanus
(d) Whooping cough

278. **A patient will not shed organisms in:** *[AP 2001]*
(a) Latent infection
(b) Incubation period
(c) Carrier State
(d) Convalescence

279. **Isolation is required till negative cultures in:**
(a) Diphtheria *[AP 2002]*
(b) Polio
(c) Hepatitis-A
(d) Tuberculosis

280. **Herd immunity is not seen in:** *[(AFMC 2000) (AI 1995) (AIIMS 1992, 2000) (AMC 1992) (Delhi 1989) (DNB 1994, 1999) (JIPMER 1980, 1997, 1989, 1993) (Kerala 1991) (NIMHANS 1998) (TN 1995) (UPASC 1989, 1992) (AP 2003)]*
(a) Polio
(b) Tetanus
(c) Measles
(d) Diphtheria

281. **The following set of words cannot be used synonymously in epidemiology:** *[AP 2005]*
(a) Source and Reservoir
(b) Index and primary case
(c) Latent infection and subclinical infection
(d) Serial interval and incubation period

282. **Communicability of a disease is determined by:**
(a) Relative risk *[Kerala 1988] [TN 2000]*
(b) Primary attack rate
(c) Attributable risk
(d) Secondary attack rate

283. **Following are biological transmission *except*:**
(a) Developmental *[TN 2000]*
(b) Propagative
(c) Cyclopropagative
(d) Cyclodevelopmental

284. **Man is an host with dead end transmission all of the following diseases, *except*:** *[TN 2005]*
(a) Rabies (b) Tetanus
(c) Malaria (d) Japanese encephalitis

285. **A carrier who gets infected from another carrier is known as:** *[TN 2005]*
(a) Incubatory carrier
(b) Paradoxical carrier
(c) Convalescent carrier
(d) Pseudo carrier

286. **Carrier has no role in transmission of which of the following disease:** *[Kolkata 2004]*
(a) Cholera
(b) Measles
(c) Diphtheria
(d) Typhoid

287. **Droplet nuclei are seen in all *except*:** *[MP 2000]*
(a) Typhoid
(b) Measles
(c) Diphtheria
(d) Pertussis

288. **Which of the following is not a method of transmission of infection through direct contact?**
(a) Transplacental *[MP 2006]*
(b) Kissing
(c) Sexual intercourse
(d) Syringe and needle

289. **Organism multiplying and developing in the hosts is called as:** *[All India 2000] [MH 2000] [MH 2000]*
(a) Cyclopropagative *[AP 2014]*
(b) Cyclodevelopmental
(c) Developmental
(d) Propagative

290. **Median incubation period means:**
(a) The time required for 50% of the cases to occur following exposure *[JIPMER 2003] [MH 2006]*
(b) Time gap between onset of primary and secondary case
(c) Interval between first clinical detection and final critical point
(d) Time between exposure to a risk factor and subsequent development of clinical manifestations of a particular disease

291. **Man is secondary host in:** *[RJ 2006]*
(a) Malaria
(b) Hydatid disease
(c) Both
(d) Filariasis only

292. **Serial Interval almost gives:** *[RJ 2009]*
(a) Incubation period
(b) Sensitivity
(c) Specificity
(d) Positive predictive value

INVESTIGATION OF AN EPIDEMIC

293. **The area is declared free of epidemic** *[AIIMS Nov 2007]*
(a) Till last secondary case recovers
(b) No new case reported for the incubation period of disease since the last case
(c) No new case reported for twice the incubation period of disease since the last case
(d) No new case reported for six months since the last case

294. **Which of the following is the initial-most step in investigation of an epidemic?** *[AIIMS Dec 1994]*
(a) Defining the population at risk *[DNB 2001, 05, 06]*
(b) Confirmation of existence of an epidemic *[WB 2007]*
(c) Verification of diagnosis
(d) Rapid search for all cases and their characteristics

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IMMUNITY, VACCINES AND COLD CHAIN

295. Which of the following statements regarding live vaccines is false? *[AIPGME 2008]*
(a) Two live vaccines cannot be administered simultaneously
(b) Booster doses are not required when live vaccines are administered
(c) Single dose gives life long immunity
(d) Live vaccine contains both major and minor antigens

296. Strain used for BCG vaccine: *[AIPGME 07]*
(a) Edmonston Zagreb strain
(b) Oka strain
(c) 'Danish' 1331
(d) RA 27/3 strain

297. Which is not true about measles vaccine? *[AIIMS Dec 1995] [AIPGME 1999]*
(a) Egg culture
(b) Freeze dried
(c) Reconstituted vaccine should be used within one hour
(d) Given after 9 months of age

298. Most heat sensitive vaccine is: *[AIIMS Nov 2008]*
(a) BCG
(b) Polio
(c) Measles
(d) DPT

299. A 10-month-old unimmunised child should be given: *[AIPGME 2000]*
(a) DPT-1, OPV-1, Measles, Vitamin-A
(b) BCG, DPT-1, OPV-1, Measles, Vitamin-A
(c) BCG, DPT-1, OPV-1
(d) BCG, DT-1, OPV-1, Measles, Vitamin-A

300. Which of the following statements is true about BCG vaccination ? *[AIIMS May 05]*
(a) Distilled water is used as diluent for BCG vaccine
(b) The site for injection should be cleaned thoroughly with spirit
(c) Mantoux test becomes positive after 48 hours of vaccination
(d) WHO recommends Danish 1331 strain for vaccine production

301. A 3 years old completely unimmunised child comes to an immunization clinic at PHC for the first time. He should receive: *[AIPGME 2004]*
(a) BCG, Measles, Vitamin-A
(b) DT-1, OPV-1, Measles, Vitamin-A
(c) BCG, DPT-1, OPV-1, Measles, Vitamin-A
(d) DPT-1, OPV-1, Measles, Vitamin-A

302. All of the following are killed vaccines *except*:
(a) Salk Polio *[AIIMS Dec 1997]*
(b) Japanese encephalitis
(c) Rabies
(d) Yellow fever

303. The efficiency of cold chain system for oral polio vaccine as monitored by Vaccine Vial Monitor (VVM) depends on: *[AIPGME 2004]*
(a) Change in the colour of vaccine
(b) Temperature indicator of the system
(c) Viral potency test
(d) Change in colour of monitor

304. The following statements are true about DPT vaccine *except*: *[AIIMS Dec 1998 & May 2008]*
(a) Aluminum salt has an adjuvant effect
(b) Whole killed bacteria of Bordetella pertussis has an adjuvant effect
(c) Presence of acellular pertussis component increases its immunogenicity
(d) Presence of *H. influenzae* type B component increases its immunogenicity

305. Which one of the following doses in Loeffler units of Diphtheria Toxoid is incorporated in DPT vaccine per dose? *[AIIMS Dec 1997]*
(a) 5
(b) 15
(c) 25
(d) 35

306. Salk vaccine is a: *[AIPGME 1994] [AIIMS Feb 1997] [JIPMER 2014]*
(a) Live vaccine
(b) Live attenuated vaccine
(c) Killed vaccine
(d) Toxoid

307. Temperature in an ILR at PHC is recorded using:
(a) Kata thermometer *[AIPGME 1992]*
(b) Sling psychrometer
(c) Dial thermometer
(d) Anemometer

308. The risk of cold chain failure is greatest at:
(a) Regional level *[AIPGME 2000]*
(b) District Level
(c) PHC level
(d) Subcentre & village level

309. If a 11-month old child has received two doses of DPT and polio, comes for further immunization after 5 months of the last dose, what should be done?
(a) Repeat the whole course *[AIPGME 1995]*
(b) Repeat the 2nd dose and continue rest of the course
(c) Give 3rd dose and continue the course
(d) Give only booster dose

310. In one single visit, a 9 month-old, un-immunized child can be given the following vaccination:
(a) Only BCG *[AIPGME 1995]*
(b) BCG, DPT-1, OPV-1 *[DPG 2007]*
(c) DPT-1, OPV-1, Measles
(d) BCG, DPT-1, OPV-1, Measles

311. All of the following statements are true about DPT vaccine *except*: *[AIIMS Nov 2002]*
(a) It should be stored in deep freezer

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(b) Exposure to direct sunlight when in use should be avoided
(c) Store stocks are needed for three months at PHC level
(d) Half used vials should not be put back into the cold chain after the session

312. Active and passive immunity should be given together in all *except*: *[AIPGME 02, 06, AIIMS Nov 97, June 1998]*
(a) Tetanus
(b) Rabies
(c) Measles
(d) Hepatitis B

313. Which vaccine is contraindicated in pregnancy?
(a) Rubella *[AIIMS Nov 97 & Dec 98; AIPGME-1992, 02, 08]*
(b) Diphtheria
(c) Tetanus *[Recent Questions 2014]*
(d) Hepatitis B

314. Antisera is obtained from *[DPG 2005]*
(a) Guinea pig
(b) Rabbit
(c) Rat
(d) Horse

315. Adjuvant used in DPT is *[DPG 2005]*
(a) Silica
(b) Magnesium
(c) Manganese
(d) Aluminium

316. Which of the following is a live vaccine?
(a) Salk polio vaccine *[DPG 2004]*
(b) Sabin polio vaccine
(c) Hepatitis B vaccine
(d) Rabies vaccine

317. Administration of which vaccine can result in paralysis in children? *[DPG 2006]*
(a) Measles vaccine
(b) Sabin polio vaccine
(c) DT vaccine
(d) DPT vaccine

318. Which of the following is called 'first immunization' of the baby? *[DPG 2007]*
(a) Colostrum
(b) Handing over the baby to mother
(c) OPV
(d) DPT+BCG

319. Which of the following vaccine is not administered at birth? *[DPG 2007]*
(a) OPV
(b) BCG
(c) Hepatitis B
(d) Hib

320. BCG vaccination is given *[Karnataka 2005]*
(a) Prodermally
(b) Subcutaneously
(c) Intramuscularly
(d) Intradermally

321. The following is true for 'Live Vaccines' *except*:
(a) Live vaccines engage certain tissues of the body
(b) Live vaccines should not be administered to a patient of Leukemia *[Karnataka 2009]*
(c) Two live vaccines cannot be given simultaneously
(d) With an exception, immunization is generally achieved with a single dose of live vaccine

322. In which of the following, Herd Immunity cannot protect the individual? *[Karnataka 2007]*
(a) Tetanus
(b) Diphtheria
(c) Poliomyelitis
(d) All of the above

323. Live vaccines are: *[Recent Question 2013]*
(a) BCG *[DNB 2000]*
(b) Oral polio vaccine *[RJ 2001, 2006]*
(c) Chickenpox vaccine *[PGI June 01]*
(d) MMR
(e) DPT

324. Vaccine (s) not to be frozen is/are: *[PGI June 01]*
(a) BCG
(b) OPV
(c) DPT
(d) Measles
(e) TT

325. In vaccines incorrect match is *[PGI June 02]*
(a) Measles – Jeryllyn *[PGI 2004]*
(b) Rubella – Copenhagen
(c) Mumps – Schwartz
(d) Chickenpox – OKA
(e) Polio – sabin

326. Live vaccine includes: *[UP 2002, Bihar 2006, PGI, 2011]*
(a) Pertussis *[DNB 2000, 2001, 2005]*
(b) BCG *[TN 1994, 2000, MP 2001, 2002]*
(c) Yellow fever
(d) Mumps
(e) Hepatitis B

327. Which of the following is false regarding Oral Polio Vaccine (OPV)? *[AIIMS Nov 2009]*
(a) It is a killed vaccine
(b) Residual neuro-paralysis is a complication
(c) Requires sub- zero temperature for storage long term
(d) Induces intestinal and humoral immunity

328. HPV vaccine is *[AIIMS November 2009]*
(a) Monovalent
(b) Bivalent
(c) Quadrivalent
(d) Bivalent & quadrivalent

329. Vaccine with maximum efficacy *[AIIMS May 2010]*
(a) OPV
(b) Measles
(c) BCG
(d) TT

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330. Which of the following vaccine should not be given during pregnancy?
(a) HBV *[DPG 2011]*
(b) Measles, Mumps, Rubella
(c) Typhoid
(d) Cholera

331. Which is true about BCG? *[AIIMS May 2011]*
(a) Distilled water is used as diluent
(b) Site for injection is cleaned with spirit
(c) Mantoux test positive in 6 weeks
(d) WHO recommends Danish 1331 for vaccine production

332. False about vaccines *[AIIMS May 2011]*
(a) Thiomersal is used as preservative in DPT vaccine
(b) Kanamycin is used as preservative in measles vaccine
(c) Neomycin is used as preservative in BCG vaccine
(d) Magnesium chloride used to stabilize OPV

333. Vaccine which should not be given to an elderly man is: *[AIPGME 2012]*
(a) Measles vaccine *[Recent Question 2015]*
(b) H. influenzae vaccine
(c) TT vaccine
(d) Pneumococcal vaccine

334. How many fully frozen ice packs should a vaccine carrier contain? *[Karnataka 2011]*
(a) 2
(b) 4
(c) 6
(d) 8

335. At Primary Health Centre (PHC) level, vaccines are stored in the *[Karnataka 2011]*
(a) Cold box *[Recent Question 2012]*
(b) Deep freezer
(c) Ice lined refrigerator
(d) Walk in cold room

336. Which vaccine(s) is/are not contraindicated in pregnancy? *[PGI May 2012]*
(a) Rubella
(b) Varicella
(c) Hepatitis B
(d) Measles
(e) Rabies

337. At PHC level vaccine storage is by: *[DNB June 2009]*
(a) ILR
(b) Walk in cold rooms
(c) Cold boxes
(d) Vaccine carriers

338. Which disease is prevented by giving booster dose to a 5-6 years old child? *[DNB December 2011]*
(a) Measles
(b) BCG
(c) DT
(d) DPT

339. Which type of vaccine is MMR? *[DNB December 2010]*
(a) Live attenuated
(b) Killed
(c) Toxoid
(d) Subunit

340 In measles outbreak, measles vaccine can be given within: *[Recent Question 2013]*
(a) 2–3 months
(b) 3–5 months
(c) 2–7 months
(d) 6–9 months

341. Name of mumps vaccine is: *[Recent Question 2012, 2013]*
(a) Jeryll Lynn
(b) Edmonston
(c) DANISH 1331
(d) OKA

342. Use of one of the following vaccination is contraindicated in pregnancy: *[DNB 2007]*
(a) Hepatitis-B
(b) Cholera
(c) Rabies
(d) Yellow fever

343. Zero dose of polio vaccine in which given:
(a) Before giving DPT *[DNB 2000, 2001, 2005, 2007]*
(b) At birth
(c) When child is having diarrhea
(d) When child is having polio

344. A full course of immunization against with 3 doses of tetanus toxoid, confers for how many years: *[DNB 2008]*
(a) 5
(b) 10
(c) 15
(d) 20

345. Additional component of UIP PLUS does not include:
(a) Hepatitis B vaccine *[NUPGET 2013]*
(b) Safe motherhood
(c) Acute respiratory infections
(d) Diarrhoea

346. Which of the following Human papilloma virus subtypes are not covered by Quadrivalent Anti-cervical cancer vaccine? *[PGI May 2013]*
(a) Type 6
(b) Type 7
(c) Type 11
(d) Type 16
(e) Type 18

347. Rabies vaccine for pre exposure prophylaxis is given at:
(a) 0, 3, 7 days *[DNB June 2010]*
(b) 0, 3, 7, 14 days
(c) 0, 3, 7, 14, 30 days
(d) 0, 7, 28 days

348. According to latest guidelines of vaccination, which of the following is applicable at the age of 5 years?

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(a) DT booster + Vitamin A [AIIMS November 2013]
(b) DT
(c) DPT + OPV
(d) DPT + Vitamin A

349. Killed vaccine is: [Recent Question 2013]
(a) Hepatitis A
(b) Measles
(c) OPV
(d) BCG

350. Hepatitis B vaccine, dose schedule in adult (months):
(a) 0, 1, 2 months [Recent Question 2012]
(b) 2, 4, 6 months
(c) 0, 6, 12 months
(d) 0, 1, 6 months

351. True about polio vaccination is all *except*: [DNB June 2010]
(a) Follow up of AFP every 30 days
(b) Salk contains three types of polio virus
(c) Pulse polio doses are extra and supplemental
(d) Oral polio vaccine provides intestinal immunity also

352. Protective levels of Tetanus anti-toxin is:
(a) >0.01 IU/ml [Recent Question 2012]
(b) >0.5 IU/ml
(c) >1.0 IU/ml
(d) >5 IU/ml

353. Which of the following is NOT a cholera vaccine?
(a) Ty21 A [Recent Question 2013]
(b) CVD-103-HgR
(c) WC-rBS
(d) mORC-Vax

354. Mass vaccination is ineffective in:
(a) Measles [Recent Question 2012]
(b) Poliomyelitis
(c) Tetanus
(d) None of the above

355. Trivalent oral polio vaccine contains, type 3 virus:
(a) 100,000 TCID 50 [Recent Question 2012]
(b) 200,000 TCID 50
(c) 300,000 TCID 50
(d) 400,000 TCID 50

356. OPV Bivalent vaccine contains: [Recent Question 2012]
(a) P1 & P2
(b) P1 & P3
(c) P2 & P3
(d) P1, P2 & P3

357. True regarding SA-14-14-2 Japanese Encephalitis vaccine: [Recent Question 2013, AIIMS November 2013]
(a) Cell culture derived live attenuated
(b) Killed vaccine
(c) Life long immunity
(d) Primary schedule consist of 2 doses

358. True regarding Cervical cancer vaccine is/are: [PGI November 2013]
(a) Bivalent and quadrivalent
(b) Given to married women in 20–45 years age group
(c) MC subtypes 16, 18
(d) Two doses given
(e) Gives 100% protection

359. Which of the following vaccines can result in Thrombocytopenia? [AIIMS May 2014]
(a) MMR vaccine
(b) Typhoid vaccine
(c) Influenza vaccine
(d) HiB vaccine

360. Which of the following is NOT true about Oral Polio Vaccine? [AIIMS May 2014]
(a) Induces both local and systemic immunity
(b) Maternal antibody is completely protective
(c) Live attenuated vaccine
(d) Requires sub-zero temperature for long term storage

361. Newborn child with HIV + and symptomatic, which vaccine will NOT be given [Recent Question 2014]
(a Measles
(b) OPV vaccine
(c) BCG
(d) Live J.E.

362. Live attenuated vaccine can be given to
(a) Children under 8 years [Recent Question 2014]
(b) HIV patients
(c) Patients on steroids
(d) Patients on radiation

363. Vaccine not given in patient with Egg allergy [Recent Question 2015]
(a) Measles
(b) MMR
(c) Varicella
(d) Influenza

364. Most common cause of Vaccine failure is [Recent Question 2015]
(a) Improper storage
(b) Improper administration
(c) Inappropriate manufacturing
(d) Maternally derived antibodies

365. First Recombinant vaccine cloned in yeast is [PGMCET 2015]
(a) Hepatitis B vaccine
(b) Measles vaccine
(c) Rubella vaccine
(d) Typhoid vaccine

366. The addition of killed Bordetella pertussis microorganisms to diphtheria toxoid enhances the antibody response of the latter because of [UPSC CMS 2015]
(a) Exotoxin of the Bordotella organism
(b) Additive action of the two antigens
(c) Formation of local granuloma
(d) Endotoxin of the Bordotella organism

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367. Which of the following vaccines is/are contraindicated in pregnancy?
1. Rubella
2. Hepatitis-B
3. Diphtheria

Select the correct answer using the code given below
[UPSC CMS 2015]

(a) 1 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

368. Eight months old child had history of unusual crying and convulsions following previous vaccination after BCG, DPT & OPV (first dose), and Hepatitis B. Now parents have brought child for next doses of vaccination. Which vaccine is contraindicated in this situation?
[UPSC CMS 2015]

(a) Measles
(b) DPT
(c) Hepatitis B
(d) DT

369. VAPP develops after ……..days of OPV administration
[Recent Question 2015]

(a) 7–14
(b) 20–60
(c) 60–90
(d) Immediately

370. Trivalent Influenza Vaccine include all except
[AIIMS November 2015]

(a) H1N1
(b) H2N1
(c) H3N2
(d) Influenza B

371. Storage at a Cool place means a temperature of
[AIIMS November 2015]

(a) 0–2°C
(b) 2–4°C
(c) 8–15°C
(d) < 0°C

Review Questions

372. Storage temperature for vaccine is: *[DNB 2004]*
(a) –4°C to 0°C
(b) 0°C to 4°C
(c) +2°C to 8°C
(d) +4°C to 12°C

373. Leprosy commonly spreads by: *[DNB 2004]*
(a) Milk
(b) Droplet
(c) Water
(d) Mosquitoes

374. Yellow fever vaccination starts protection after how many days of injection: *[DNB 2005, 2007]*
(a) 5 days
(b) 10 days
(c) 15 days
(d) 20 days

375. 'Ring vaccination is: *[DNB 2006]*
(a) Given by a ring shaped machine
(b) Given to produced a ring shaped lesion
(c) Given around 200 yards of a case detected
(d) Given around a mile of a case detected

376. Use of the following vaccination is generally contraindicated in pregnancy: *[DNB 2007]*
(a) Hepatitis B
(b) Cholera
(c) Rabies
(d) Yellow fever

377. The neurological complications of DPT are due to:
(a) Pertussis component *[Bihar 2003]*
(b) Diphtheria
(c) Tetanus
(d) Adjuvant

378. MMR vaccine is given at what age in India:
(a) 9 – 12 months *[Bihar 2004]*
(b) 12 – 15 months
(c) 15 – 18 months
(d) 18 – 24 months

379. For typhoid best vaccine is: *[Bihar 2006]*
(a) Typhoid oral
(b) Whole cell vaccine
(c) Vi polysaccharide vaccine
(d) None

380. A 5 years male boy having no immunization:
(a) OPV + BCG + Measles + DPT *[Bihar 2006]*
(b) BCG + OPV + Measles + DT
(c) BCG + OPV + TT
(d) BCG + TT

381. In pulse polio immunization programme, VVM (Vaccine monitoring vial) to maintain the cold chain, which of the following indication to discard the vaccine is:
[UP 2002]

(a) Inner square is white
(b) Inner square is lighter than outer circle
(c) Inner square darker than the outer circle
(d) Outer circle is more dark than inner square

382. DPT vaccine stored in: *[UP 2003, MH 2005]*
(a) –4°C
(b) 0°C
(c) 4°C
(d) 10°C

383. Freeze dried vaccine is: *[UP 2003]*
(a) BCG
(b) Rabies

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(c) DPT
(d) Hepatitis-B

384. True about secondary booster response in comparison to that of primary response are all *except*: *[UP 2003]*
(a) Shorter latent period
(b) Antibody is maximum
(c) Antibody responses maintained at higher levels for a longer period of time
(d) Production of antibody more slow

385. Toxoid vaccines: *[UP 2003]*
(a) The micro-organism produces exotoxins
(b) The micro-organism produces endotoxins
(c) The organism killed by heat or chemical
(d) These organisms passed repeatedly in the laboratory in tissue culture

386. Which of the following is inactivated vaccine:
(a) Salk polio vaccine *[Kerala 2001] [UP 2004]*
(b) Ty21 typhoral vaccine
(c) HDC-Edmonston-Zagreb measles strain
(d) BCG

387. All are true statement regarding BCG vaccination *except*: *[UP 2005]*
(a) Given subcutaneously
(b) It can be given in tuberculin negative patients
(c) Prevent haematogenous spread
(d) It is prepared from M. bovis

388. Immunoglobulins found maximum is secretions:
(a) IgM *[UP 2006]*
(b) IgG
(c) IgA
(d) IgD

389. The vaccine administered as "Nose drops":
(a) Rubella *[UP 2006]*
(b) Poliomyelitis
(c) Influenza
(d) Measles

390. Congenital passive immunity is NOT found in:
(a) Polio *[UP 2008]*
(b) Mumps
(c) Rubella
(d) Measles

391. All are correct regarding Premunition *except*:
(a) It is a state of active immunity *[AP 2000]*
(b) Protects an individual
(c) Protects entire community
(d) Immunity depends on the presence of an inactive infection with the same species in the host

392. Rabies: *[AP 2003]*
(a) Cell culture vaccine is cheaper and effective
(b) BPL vaccine has more number of doses
(c) Cell culture vaccine is less effective
(d) None

393. All are killed vaccines *except*: *[Kolkata 2002]*
(a) Measles
(b) Hepatitis B
(c) Plague
(d) Diphtheria

394. Minimum gap that should be allowed in between to administer two live vaccines: *[Kolkata 2004]*
(a) 2 weeks
(b) 4 weeks
(c) 2 months
(d) 4 months

395. Which of the following is not a killed vaccine:
(a) DPT *[Kolkata 2004]*
(b) Rabies
(c) Hepatitis B
(d) Rubella

396. Human immunoglobulin is given in all *except*:
(a) Rabies *[Kolkata 2009]*
(b) Hepatitis B
(c) Measles
(d) Chickenpox

397. Mg2+ ion is used as an stabilizer in
(a) OPV *[Kolkata 2009]*
(b) DPT
(c) BCG
(d) Measles

398. Active and passive immunization is done simultaneously in all *except*: *[MP 2001]*
(a) Hepatitis B
(b) Measles
(c) Rabies
(d) Tetanus

399. Vaccine preventable neonatal disease is:
(a) Tuberculosis *[MP 2003]*
(b) Measles
(c) Pertussis
(d) Tetanus

400. The strain which is used for production of BCG vaccine at commercial level is: *[MP 2003]*
(a) Bacille Calmette-Guerin
(b) Tween-80
(c) Danish-1331
(d) PPD-RT-23

401. Ty 21a is vaccine of: *[MP 2005]*
(a) Typhoid
(b) Cholera
(c) Hepatitis
(d) Rota virus

402. Under UIP programme which of the following vaccines is administered at 9 months of age?
(a) DPT-1 *[MP 2006]*
(b) BCG *[Recent Question 2013]*
(c) Measles
(d) Hepatitis B-1

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403. Recommended dose of anti-rabies serum to be given for passive immunization of adult victim of dog bite is:
(a) 20 i.u. *[MP 2009]*
(b) 40 i.u.
(c) 60 i.u.
(d) 80 i.u.

404. The vaccines is yet to be available for:
(a) Dengue fever *[MP 2009]*
(b) Japanese encephalitis
(c) Yellow fever
(d) Russian spring summer encephalitis

405. Toxic shock syndrome is due to which vaccine:
(a) Mumps *[RJ 2001]*
(b) Measles
(c) Salk
(d) Tetanus

406. BCG vaccine is: *[RJ 2002]*
(a) Killed
(b) Live attenuated
(c) Toxoid
(d) Cellular fraction

407. BCG is given: *[RJ 2002]*
(a) Intramuscular
(b) Intradermal
(c) Subcutaneous
(d) Intravenous

408. In national immunization programme, total No of OPV dose are: *[RJ 2003]*
(a) 3 (b) 4
(c) 5 (d) 6

409. Salk vaccine is: *[RJ 2004]*
(a) Live
(b) Killed
(c) Toxoid
(d) None

410. Passive immunization is available for all except:
(a) Tetanus *[RJ 2005]*
(b) Hepatitis
(c) Diphtheria
(d) Measles

DISINFECTION

411. Rideal-Walker Coefficient is employed for the assessment of : *[AIIMS June 1991]*
(a) Effect of autoclaving
(b) Sufficiency of Pasteurisation
(c) Effect of incineration
(d) Germicidal power of a disinfectant

412. Standard against which disinfectants are measured is:
(a) Chlorine *[AIIMS Dec 1991]*
(b) Ozone
(c) Phenol
(d) UV Radiation

413. Chlorine exerts a disinfectant action in all *except*:
(a) Bleaching powder *[AIIMS May 2001]*
(b) Cetrimide
(c) Halozone tablets
(d) Sodium hypochlorite

414. 'Savlon' contains: *[AIIMS Dec 1991]*
(a) Chlorhexidine and chlorxylenol
(b) Cetavlon and chlorxylenol
(c) Cetavlon and hibitane
(d) Hibitane and chlorxylenol

415. Which of the following is not a sporicidal agent?
(a) Glutaraldehyde *[DPG 2007]*
(b) Formaldehyde
(c) Chlorine dioxide
(d) Cresol

416. Disinfection of water by routine chlorination can be classified as *[Karnataka 2005, 2007]*
(a) Sterilization
(b) Concurrent disinfection
(c) Terminal disinfection
(d) Pre-current disinfection

417. Sputum can be disinfected by *[DPG 2002]*
(a) Boiling (b) Burning
(c) Drying (d) Autoclaving

418. Savlon contains *[AIIMS May 2010]*
(a) Cetrimide + chlorhexidine
(b) Cetrimide + chlorhexidine + butyl alcohol
(c) Cetrimide + butyl alcohol
(d) Cetrimide + Cetavlon

419. There is an outbreak of MRSA infection in a ward of a hospital. What is the best way to control the infection? *[AIIMS Nov 2010]*
(a) Vancomycin given empirically to all the patients
(b) Frequent fumigation of the ward
(c) Wearing masks before any invasive procedure in ICU
(d) Washing of hands before and after attending the patients

420. Sputum is sterilized by all *except*: *[AIIMS Nov 2010]*
(a) Autoclaving
(b) Boiling
(c) Cresol
(d) Chlorhexidine

421. Which of the following is used to test the efficiency of sterilisation of an autoclave?
(a) Bacillus subtilis *[AIIMS November 2011]*
(b) Clostridium tetani
(c) Bacillus stearothermophilus
(d) Bacillus pumilus

422. The amount of bleaching powder necessary to disinfect choleric stools, is: *[Recent Question 2012]*
(a) 50 gm/lit
(b) 75 gm/lit
(c) 90 gm/lit
(d) 100 gm/lit

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423. Sterilization and disinfection of blood spills is done by: *[DNB December 2010]*

(a) Formaldehyde
(b) Sodium hypochlorite
(c) Tincture iodine
(d) Phenols

424. Syringes and glassware are sterilized by:

(a) Irradiation *[DNB June 2011]*
(b) Autoclave
(c) Hot air oven
(d) Glutaraldehyde

425. Nosocomial infections are those which develop *[Recent Question 2014]*

(a) Within 24 hours after hospitalization
(b) Within 48 hours of hospitalization
(c) After 48 hours of hospitalization
(d) After 7 days of hospitalization

426. Glass can be sterilized by *[Recent Question 2015]*

(a) Incineration at 1050 degrees Celsius for 5-10 minutes
(b) Hot air oven 121 degrees Celsius for 30-60 minutes
(c) Autoclaving at 121 degrees Celsius for 30-60 minutes
(d) Hot air oven 160 degrees Celsius for 30-60 minutes

427. Anti-viral agent is *[Recent Question 2015]*

(a) Chlorhexidine
(b) Betapropionolactone
(c) Hypochlorite
(d) Phenol

428. All are Methods of sterilization by Dry heat *except*: *[ESI IMO 2014]*

(a) Flaming
(b) Incineration
(c) Hot air oven
(d) Autoclaving

Review Questions

429. Disinfectant is one which: *[MH 2000]*

(a) Kills bacteria and spores
(b) Kills bacteria only
(c) Kills spores only
(d) Kills viruses

430. Fibreoptic scopes are sterilized by:

(a) Glutaraldehyde *[AIIMS Nov 2003 [MH 2002]*
(b) Ethylene oxide *[JIPMER 2014]*
(c) Autoclaving
(d) Alcohol

MISCELLANEOUS

431. As compared to a routine case control study, nested case control study avoids problems (in study design) related to: *[AIIMS Nov 04]*

(a) Temporal association
(b) Confounding bias
(c) Need for long follow up
(d) Randomization

432. When an intervention is applied to community to evaluate its usefulness, it is termed as a trial for:

(a) Efficacy *[AIIMS Nov 05, AIPGME 06]*
(b) Effectiveness
(c) Efficiency
(d) Effect modification

433. A total of 5000 patients of glaucoma are identified and surveyed by patient interviews regarding family history of glaucoma. Such a study design is called:

(a) Case series report *[AIIMS Nov 2004]*
(b) Case control study
(c) Clinical trial
(d) Cohort study

434. In assessing the association between maternal nutritional status and the birth weight of the newborn, two investigators A and B studied separately and found significant results with P values 0.02 and 0.04 respectively. From this information, what can you infer about the magnitudes of association found by the two investigators? *[AIPGME 2003]*

(a) The magnitude of association found by investigator A is more than found by B
(b) The magnitude of association found by investigator B is more than that found by A
(c) The estimates of association obtained by A and B will be equal, since both are significant
(d) Nothing can be concluded as the information given is inadequate

435. Which of the following statements is false about nested case control study? *[AIIMS Nov 1992]*

(a) Is a cohort study nested in a case control study
(b) It maintains temporal association
(c) Is useful for rare diseases with expensive diagnostic tests
(d) Recall bias is not seen

436. A drug company is developing a new pregnancy-test kit for use on an outpatient basis. The company used the pregnancy test on 100 women who are known to be pregnant. Out of 100 women, 99 showed positive test. Upon using the same test on 100 non-pregnant women, 90 showed negative result. What is the sensitivity of the test ? *[AIIMS May 03]*

(a) 90%
(b) 99%

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(c) Average of 90 & 99
(d) Can't be calculated from the data

437. The extent to which a specific health care treatment, service, procedure, program, or other intervention does what it is intended to do when used in a community dwelling population is termed its: *[AIPGME 2006]*
(a) Efficacy
(b) Effectiveness
(c) Effect modification
(d) Efficiency

438. Iron and Folic acid supplementation forms:
(a) Health promotion *[AIPGME 02]*
(b) Specific protection
(c) Primordial prevention
(d) Secondary prevention

439. All of the following are true about the Herd Immunity for infectious diseases *except*: *[AIPGME 05, 07]*
(a) It refers to group protection beyond what is afforded by the protection of immunized individuals
(b) It is likely to be more for infections that do not have a sub-clinical phase
(c) It is affected by the presence and distribution of alternative animal hosts
(d) In the case of tetanus it does not protect the individual

440. Evidence based medicine, which of the following is not useful *[PGI Dec 07]*
(a) Personal exposure
(b) RCT
(c) Case report
(d) Meta analysis
(e) Systematic review

441. Discovery of cholera by John Snow was a: *[Recent Question 2013] [DNB December 2011]*
(a) Cohort study
(b) Cross-sectional study
(c) Natural experiment study
(d) Clinical trial

442. Hypothesis is not tested by: *[DNB June 2011]*
(a) Descriptive studies
(b) Analytical studies
(c) Case control studies
(d) Cohort studies

443 KAP studies were first used in India to study *[Recent Question 2015]*
(a) HIV
(b) Malaria
(c) Family planning
(d) Carcinoma cervix

Review Questions

444. Reverse cold chain is seen in: *[UP 2000]*
(a) Expired vaccine from PHC to manufactured
(b) Carrying vaccine to periphery center
(c) Testing for potency of vaccine
(d) Stool specimen of polio send for testing

445. Disability free life expectancy is measured by:
(a) Human development index *[Kolkata 2005]*
(b) Physical quality of life index
(c) Sullivan's index
(d) Chandler's index

446. About premunition all are true *except*:
(a) Good for individual *[MP 2001]*
(b) Good for community
(c) Species specificity present
(d) Prevention from infection

447. Hospital based study among following is:
(a) Cohort *[MP 2003]*
(b) Case control study
(c) Cross-sectional
(d) Cross over study

448. In the context of epidemiology-a set of questions is constructed in such a manner that it takes into account all the important epidemiological factors of a given disease: *[RJ 2007]*
(a) Health model
(b) Epidemiological triad
(c) Epidemiological surveillance
(d) Mathematical model

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EXPLANATIONS

DEFINITION AND EPIDEMIOLOGICAL METHODS

1. **Ans. (a) Cross-sectional study** *[Ref. Park 23/e p69]*

CROSS SECTIONAL STUDY:

- Is based on the single examination of a cross-section of a population *'at one point of time'* , results of sample are then projected to whole population
- Is simplest form of observational epidemiological study
- Provides *'Prevalence of the disease'* under study
- More useful for chronic diseases
- Tells about distribution of a disease in a population, *'rather than its etiology'*
- Gives *'Snapshot of a population'*
- Cannot establish causality as *'does not establish time sequence'*
- Provides little information about the natural history of disease or incidence

2. **Ans. (*b*) Ecological** *[Ref. Park 23/e p62]*

Also Remember

- *Types of epidemiological studies*:

Type of epidemiological study			Unit of study
1.	**Observational studies**		
	a.	Descriptive studies *(Hypothesis formulation)*	
	b.	Analytical studies *(Hypothesis testing)*	
		i. Cohort study	Individual
		ii. Case control study	Individual
		iii. Cross sectional study	Individual
		iv. Ecological study	Population
2.	**Experimental studies** *(Hypothesis confirmation)*		
	a.	Randomized controlled trial	Patients
	b.	Field trial	Healthy people
	c.	Community trial	Community

3. **Ans. (d) Evidence is generated from weak and poor studies** *[Ref. Grading quality of evidence and strength of recommendations, BMJ 2004; p1490]*

EVIDENCE BASED MEDICINE/ PRACTICE

- Is considered *'Gold standard for clinical practice'*
- Aims to apply best available evidence gained from scientific method to clinical decision making
- Research paper is investigated by the tools quoted in research paper itself to check validity
- Highest importance is given to strongest epidemiological studies
  - *Most impor*tant: Meta-analyses, Systematic reviews, Blinded trials
  - *Least importance*: Opinions and conventional wisdom of researchers and experts
- *Statistical parameters used:*
  - Likelihood ratios
  - Receiver operator characteristic curve

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4. **Ans. (a) Longitudinal studies** *[Ref. K. Park 23/e p69]*
5. **Ans. (b) Ecological study** *[Ref. K. Park 23/e p62]*
6. **Ans. (a) Sackett** *[Ref. Encyclopedia of Public Health by W. Kirch, Pg 417]*
   - Father of Evidence based medicine (EBM): David Sackett
     - Founded first Department of Clinical Epidemiology in Canada
     - Founded Oxford Centre for EBM
     - Wrote books:

   1. Clinical Epidemiology
   2. Evidence Based Medicine

Review Questions

7. **Ans. (d) Variable to be tested** *[Ref. Park 23/e p70]*
8. **Ans. (a) Descriptive epidemiology** *[Ref. Park 23/e p73]*
9. **Ans. (d) Descriptive epidemiology** *[Ref. Park 23/e p63]*

MEASUREMENTS IN EPIDEMIOLOGY

10. **Ans. (*c*) Incidence is a rate but prevalence is not** *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p67]*

    TOOLS OF MEASUREMENT IN EPIDEMIOLOGY:
    - *Rate*: Numerator (a) is a part of denominator (b) and multiplier is 1000 or 10,000 or 100,000 or so on…
    - *Ratio*: Numerator (a) is not a part of denominator (b) and BOTH numerator and denominator are unrelated
    - *Proportion*: Numerator (a) is a part of denominator (b) and multiplier is 100
      - Proportion is always expressed in percentage (%)
    - Incidence is a rate, Prevalence is a proportion
11. **Ans. (c) Proportion** *[Ref. K. Park 23/e p55]*
12. **Ans. (b) 10 per 1000** *[Ref. K. Park 23/e p60]*
13. **Ans. (b) Population at risk** *[Ref. K. Park 23/e p60]*

Review Questions

14. **Ans. (a) Numerator is component of denominator** *[Ref. Park 23/e p55]*
15. **Ans. (c) Increases with increase in duration of disease** *[Ref. Park 23/e p61]*

IDC

16. **Ans. (c) Line Ic** *[Ref. Park 23/e p56]*

    WHO RECOMMENDED DEATH CERTIFICATE (for International use):
    - *Consist of four lines*:
      - *Line Ia*: Disease or condition directly leading to death
      - *Line Ib*: Antecedent/ underlying cause
      - *Line Ic*: MAIN ANTECEDENT/ UNDERLYING CAUSE
      - *Line II*: Other significant conditions contributing to death BUT not related to disease/ condition causing it
    - Concept of underlying cause, Line Ic is the MOST IMPORTANT line in death certificate, thus also known as *'Essence of Death Certificate'*

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Also Remember

- *Registration of vital events in India*: 100% registration of 4 vital events by 2010 (under National Population Policy 2000)
  - *Birth*: Central Births and Deaths Registration Act' 1969 (REGISTER < 21 DAYS)
  - *Death*: Central Births and Deaths Registration Act' 1969 (REGISTER < 21 DAYS)
  - *Marriage*: The Hindu Marriage Act, 1955 (REGISTER < 30 DAYS)
  - *Pregnancy*: No legislation yet in India

MORTALITY MEASUREMENTS

17. Ans. (a) Is a form of direct standardization *[Ref. Park 23/e p58-59]*

- *Adjusted or standardized rates*:
  - While comparison of death rates of two populations, *'crude death rate is not the right yardstick'*, as age-compositions are different
  - Age-adjustment or age-standardization removes confounding effect of different age structures
- *Indirect standardization*: *Standardized mortality ratio (SMR)*:
  - Is simplest and most useful form
  - *Method*: Calculate expected deaths, assuming that study group experiences the death rates of a standard population

$$SMR = \frac{\text{Observed deaths}}{\text{Expected deaths}} \times 100$$

  - *Feasibility*: Permits adjustment where age-specific rates (ASDRs) are not available or are unstable because of small numbers

Also Remember

- *Types of population used in standardization*:
  - *In direct standardization*: Mortality rates of population of interest are used
  - *Indirect standardization*: Mortality rates of standard population are used
- *Other indirect standardization techniques*:
  - Life table analysis
  - Regression techniques
  - Multivariate analysis
  - Survival analysis

18. Ans. (d) Survival rate *[Ref. Park 23/e p58]*

- *Survival rate*: Is the proportion of survivors in a group (e.g. of patients), studied and followed over a period of time (e.g. over a period of 5 years)
  - Is used to *'describe prognosis'* in certain disease conditions
  - Can be used as a *'yardstick for the assessment of standards of therapy'*
  - Survival period is usually reckoned from the date of diagnosis or start of the treatment
  - Quite useful in cancer studies
  - *Survival rate calculation*: $SR = \frac{\text{Total No. of patients alive after 5 years}}{\text{Total No. patients diagnosed or treated}} \times 100$
- *Specific death rate*:
  - Help identify particular 'at risk' group(s) for preventive action
  - Permit comparison between different causes within same population

  Specific death rate calculation: $SDR = \frac{\text{No. of deaths from a specific cause in a year}}{\text{Mid year population}} \times 100$
- *Case fatality rate*:
  - CFR represents *'killing power of a disease'*
  - It is *'closely related to virulence of organism'*
  - *CFR calculation*: $CFR = \frac{\text{No. of deaths due to a disease}}{\text{No. of cases of that disease}} \times 100$

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- *Proportional mortality rate*: No. of deaths due to a particular cause (or in a specific age group) per 100 (or 1000) total deaths.
  - Is *'simplest measure of estimating the burden of a disease'* in the community
  - *Is a useful health status indicator*: Indicates magnitude of preventable mortality

$$\text{PMR} = \frac{\text{Deaths due to a disease}}{\text{Total deaths from all diseases}} \times 100$$

Also Remember

- CFR is the *'complement of Survival Rate'*
  CFR = 1 – Survival Rate
- Survival analysis is carried out by using *'Kaplan Meier Estimator'* (Product limit estimator)
  - KME is a non-parametric estimation
  - *Advantage of KME*: takes into account *'censored data'* (part of sample lost)

19. Ans. (a) Age specific death rate is not needed *[Ref. Park 23/e p58-59]*

	Direct Standardization	Indirect Standardization
Method	Use actual ASDRs* on the standard age structure	Use standard ASDRs* on the actual age structures
Utility when 1. *No. of deaths in each age group* 2. *Population in each age group*	Both are available	Both are unavailable

(ASDR*: Age Specific Death Rate)

20. Ans. (d) Age-standardized mortality rate *[Ref. Park 23/e p58-59]*

21. Ans. (a) Standardised mortality rate *[Ref. Park 23/e p58-59]*

22. Ans. (c) 1st July *[Ref. Park 23/e p57]*

- *Crude birth rate (CBR)*: Annual number of live births per 1000 mid-year population
- *Crude death rate (CDR)*: Annual number of deaths per 1000 mid-year population
  - *Findings of SRS Bulletin*: [2013]
    1. Crude Birth Rate (CBR): 21.6 per 1000 mid-year population
    2. Crude Death Rate (CDR): 7.0 per 1000 mid-year population

Also Refer to Annexure 2

23. Ans. (c) Duration of sickness *[Ref. Park 23/e p23-27]*

INDICATORS OF HEALTH:

- *Mortality indicators*:
  - Crude death rate (CDR)
  - Life expectancy (LE)
  - Infant mortality rate (IMR)
  - Child mortality rate (CMR)
  - Under 5 proportional mortality rate (U5MR)
  - Maternal mortality rate (MMR)
  - Disease specific mortality
  - Proportional mortality rate

Also Remember

- *Best indicators of socio-economic development of a country*:
  - U5MR (best indicator)
  - IMR (2nd best indicator)
- *Life expectancy (LE)*:
  - LE is a POSITIVE mortality indicator
  - LE is used for derivation of:
    1. PQLI
    2. Human development index (HDI)

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24. Ans. (d) 25% *[Ref. Park 23/e p58]*
In the given question, in an outbreak of cholera in a village of 2000 population, 20 cases have occurred and 5 have died,
Thus, CFR = Total no. of deaths due to a disease/ Total no. of cases due to that disease × 100

Or, CFR = $\frac{5}{20} \times 100 = 25\% = 25\%$

And, Survival rate = 1 – CFR = 1 – 0.25 = 0.75 (75%)

25. Ans. (b) The national population is always taken as the standard population *[Ref. Basic Epidemiology by Beaglehole, WHO; p25 Park 23/e p58-59]*

- *Standard population*: Is a population where numbers in each age and sex group are known
  - *Two frequently used standard populations are*:
    1. Segi world population
    2. European standard population
  - *Choice of standard population is arbitrary*:
    1. Available standard populations may be used
    2. Standard population may also be created using 2 populations
    3. The national population need not always be taken as the standard population
    4. *Is commonly used in occupational studies*: Comparison of mortality in an industry and general population
    5. Can be used for occurrence of disease (rather than death)

26. Ans. (c) Age distributions *[Ref. Park 23/e p58]*

27. Ans. (b) Case fatality rate *[Ref. Park 23/e p58]*

- CFR is the *'complement of Survival Rate'*
  CFR = 1 – Survival Rate

Also Remember

- *CFR of few important diseases*:

Diseases	Case fatality rate
Rabies	100%
Yellow fever	80%
Japanese encephalitis	30 – 35% (median 35%)
Chicken pox	< 1%.

28. Ans. (b) Case fatality rate *[Ref. Park 23/e p58]*

29. Ans. (a) Proportional mortality rate *[Ref. Park 23/e p58]*

30. Ans. (c) Virulence *[Ref. Park 23/e 58]*

31. Ans. (a) It is a ratio; (d) It is useful in chronic diseases *[Ref. Park 23/e p58]*

32. Ans. (c) Chronic illness *[Ref. Park 23/e p58]*

33. Ans. (c) Age distribution *[Ref. Park 23/e p58]*

34. Ans. (b) Case fatality rate (CFR) *[Ref. Park 23/e p58]*

35. Ans. (a) Age *[Ref. Park 23/e p58]*

36. Ans. (b) Age distributions *[Ref. Park 23/e p58]*

37. Ans. (c) Proportion *[Ref. K. Park 23/e p58]*

38. Ans. (c) Total deaths in that year *[Ref. Park 23/e p58]*

39. Ans. (c) Comparison between different sexes in relation to injuries/ accidents *[Ref. Park 23/e p53]*

$$\text{ASDR} = \frac{\text{Total no. of deaths in a specific age group}}{\text{Total estimated population is same age group}} \times 100$$

Review Questions

40. Ans. (c) Measures life expectancy free of disability *[Ref. Park 23/e p26]*

41. Ans. (d) All of the above *[Ref. Park 23/e p57]*

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42. Ans. (c) Killing power of a disease with no time interval *[Ref. Park 23/e p58]*

43. Ans. (d) Case fatality rate *[Ref. Park 23/e p58]*

44. Ans. (c) Killing power of disease *[Ref. Park 23/e p58]*

45. Ans. (a) Disability rate *[Ref. Park 23/e p26]*

46. Ans. (a) Standardized mortality *[Ref. Park 23/e p58-59]*

MORBIDITY MEASUREMENTS

47. Ans. (a) Incidence will not change *[Ref. Park 23/e p60]*

- *Relationship between Incidence and Prevalence*: ***Given the assumption*** that population is stable AND incidence & duration are unchanging,
  Prevalence = Incidence × Mean duration of the disease
  P = I × d
  - Incidence reflects causal factors
  - Duration reflects the prognostic factors

In the given question, a new effective treatment is initiated and all other factors remain the same,
Thus new cases will keep on occurring at the same rate,
So, incidence will not change
However, effective treatment will cure more cases, so old cases will reduce,
So, prevalence will reduce
HOWEVER, OVER LONG PERIOD OF TIME, incidence MAY also reduce if it is an infectious disease (as total case load in the community is reducing)

48. Ans. (c) Decrease the incidence of the disease *[Ref. Park 23/e p60]*

INCIDENCE:

- Is defined as the *'no. of new cases'* occurring in a defined population during a specified period of time
- *For a given period*,
  Incidence = Number of new cases of disease/Total population at risk × 1000
- *Incidence is a RATE*, expressed per 1000
- *Special types of incidence rates*:
  - *Attack rate*: Incidence rate used when population is exposed for a small interval of time, e.g. epidemic
  - *Secondary Attack Rate (SAR)*: Is no. of exposed persons developing the disease within range of incubation period, following exposure to the primary case

In the given question, there is an improved prevention of an acute, nonfatal disease,
Thus, no. of new cases or incidence will reduce

Also Remember

- Incidence rate is also known as *'Incidence density'*
- Cumulative incidence measures denominator *'only at the beginning of the study'*

49. Ans. (b) The apparent 5 yr survival rate will increase *[Ref. Epidemiology by Leon Gordis 4/e p97, Park 23/e p58-61]*

- *Incidence*: Is 'number of new cases occurring in a defined population over a specified period of time'
- *Prevalence*: Is total current (Old + New) cases in a given population over,
  - *Types of prevalence*:
    i. a point of time (*Point Prevalence*)
    ii. a period of time (*Period Prevalence*)
  - Prevalence = Incidence × Mean duration of disease [P = I × d]
  - Prevalence describes the balance between incidence, mortality and recovery
- *Age adjusted (standardized) mortality rate*:
  - Removes confounding effect of different age structures in 2 populations, while comparing crude death rates
  - Standardization may be:
    1. *Direct standardization:* Availability of age-specific death rates and population in each age group
    2. *Indirect standardization: Standardized mortality ratio (SMR):* Age-specific rates are not available
- *Survival rate*:
  - *Survival rate calculation*: $SR = \frac{\text{Total No. of patients alive after 5 years}}{\text{Total No. of patients diagnosed or treated}} \times 100$
  - *Survival rate is complement of Case fatality rate (CFR)*: SR = 1 – CFR

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- *WHENEVER screening is performed*: Higher 5-year survival rate is observed; THIS IS A POTENTIAL BIAS DUE TO earlier diagnosis being made (and not because people live longer)

  In the given question, a diagnostic test has been introduced that will detect a certain disease 1 yrs earlier than it is usually detected,

  Thus, Incidence rate (new cases) will remain same after 10 years

  Since duration of disease will remain same, the period prevalence rate will remain same after 10 years

  And it will also have no effect on age adjusted mortality rate

  But, since disease is getting detected 1 year earlier than usual (LEAD TIME), treatment can be started 1 year earlier (CFR will be apparently lowered), thus leading to apparent increase in survival rate

Also Remember

- *5–year survival rate*:
  - Is used as '*an index of success in cancer treatment*'
  - Is not an appropriate measure to assess therapy that was introduced less than 5 years ago
- *Life table approach*: Is used for calculating the '*actual observed survival*' overtime
  - It attempts to predict the onset of events over time from previous patterns for all patients at risk
  - Cohorts of patients are followed up to determine prognosis
  - Probabilities are calculated of survival for different lengths of time
  - Assumptions made in Life table analysis:
    1. There is no secular (temporal) change in effectiveness of treatment or in survivorship over calendar time
    2. Survival experience of people who are lost to follow-up is same as experience of those who are followed-up
  - Kaplan Meier Method:
    1. Is an approach for Life table analysis
    2. In KM method, '*predetermined intervals (1 month, 1 year, etc.) are not used*'
    3. Exact point in time where death took place is identified; each death terminates previous interval and a new interval is started
    4. KM method is suited for small studies
- *Median survival time*:
  - Is the length of time that half of the study population survives
  - Advantages over Mean survival:
    1. Median survival time is less affected by extreme values (outliers)
    2. Observation of only half of the deaths in the group is required (not of the whole group)
- *Relative survival time*:
  - Is the ratio of observed survival to the expected survival rate–

50. Ans. (a) Disease is very fatal and /or easily curable *[Ref. Park 23/e p60-61]*

- *Relationship between Incidence and Prevalence*: ***Given the assumption*** that population is stable AND incidence & duration are unchanging,

  Prevalence = Incidence × Mean duration of the disease P = I × d
  - Incidence reflects causal factors
  - Duration reflects the prognostic factors
- **In the given question,** the prevalence is very low as compared to the incidence for a disease, and P = I × d,

  Thus, d has to be low; duration of the disease can be short under 2 circumstances:
  - Either disease is very fatal, or
  - Disease is easily curable
- ***Another situation,*** if incidence for a disease is higher among females but prevalence is same in both the sexes, **Since P = I × d,**

  Thus, d (duration of disease) must be lower among females:
  - Either the disease is more fatal among females, or
  - Disease is easily curable among females
- ***Another situation,*** if a drug reduces mortality due to a disease but does not cure,

  Then,
  - Duration of disease is getting increased (as drug is not curing the disease, but reducing deaths)
  - Incidence of disease will be unaffected/remain same (as cases are not getting cured, disease will keep on transmitting at the same rate)

    Since P = I × d,
  - Prevalence will also increase (as incidence is same, but duration of disease is increasing: old cases will keep on increasing)

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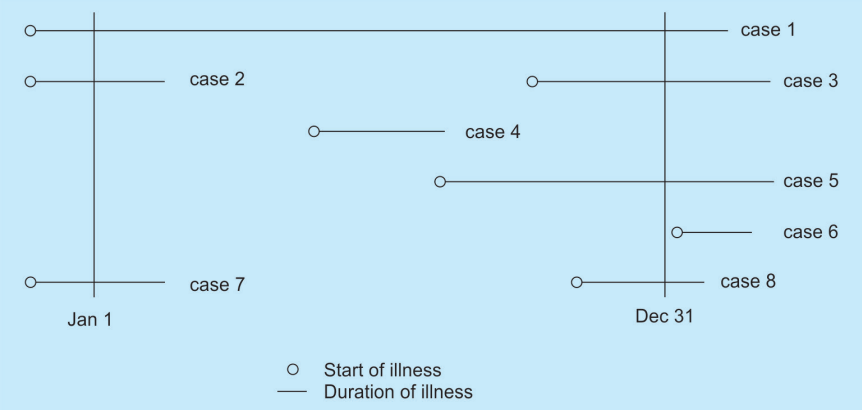
- ***Another situation,*** if a new better vaccine for a disease is introduced in a community,
  Then,
  - Incidence of the disease will decrease over a period of time (as better vaccine implies better protective efficacy against the disease)
  - Duration of disease will remain same (as over a short period of time, a new vaccine is not likely to affect the natural history of the disease)
    Since P = I × d,
  - Prevalence will also reduce over a period of time (as incidence is reducing and duration of disease is remaining same)

51. Ans. (b) The case fatality rate for this disease is higher for women *[Ref. Park 23/e p60-61]*
In the given question, if incidence for a disease is 5 times higher among females but prevalence rate show no sex difference,
Since P = I × d,
Thus, d (duration of disease) must be lower among females
- Either the disease is more fatal among females, or
- Disease is easily curable among females

52. Ans. (d) Describes the balance between incidence, mortality and recovery *[Ref. Park 23/e p60-61]*
- Prevalence = Incidence × Mean duration of disease **P = I × d**
  - Prevalence describes the balance between incidence, mortality and recovery
- *Incidence is the best measure of disease frequency in etiological studies*
- *Incidence can be determined from*: Cohort study
- *Prevalence can be determined from*: Cross Sectional Study.

Also Remember

- Incidence is 'number of new cases occurring in a defined population over a specified period of time'
- *'Prevalence is a Proportion'*
- **Example:** For a city with a population of 1000, following figure represents occurrence of the disease 'Tuberculosis'. Each circle represents one case and length of the horizontal line represents the duration of the disease.



Incidence would include cases	:	3, 4, 5 and 8
Point prevalence (Jan 1) cases	:	1, 2 and 7
Point prevalence (Dec. 31) cases	:	1, 3, 5 and 8
Period prevalence (Jan-Dec) cases	:	1, 2, 3, 4, 5, 7 and 8

Figure: Number of cases of a disease beginning, developing and ending during a period of time

- Incidence Tuberculosis 2007 = 4/1000 × 1000 = 4 per thousand
- Point Prevalence Tuberculosis January 1, 2007 = 3/1000 × 100 = 0.3 %
- Point Prevalence Tuberculosis December 31, 2007 = 4/1000 × 100 = 0.4 %
- Period Prevalence Tuberculosis 2007 = 7/1000 × 100 = 0.7 %

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53. Ans. (d) 20 *[Ref. Park 23/e p61-2]*

- *Prevalence* is defined as all current cases (old + new) at a given point of time
- Prevalence = $\frac{\text{No. of all current cases of a disease at a time}}{\text{Estimated total population at that time}} \times 100$

And '*cases are those persons having the disease*' (Controls are healthy people, without the disease)

In the given question,

Test result	Disease	
	Present: Cases	**Absent: Controls**
+	180	400
–	20	400
Total	**200**	**800**

Thus, Prevalence = 200/(200 + 800) × 100 = 20%

Also Remember

- PREVALENCE IS A PROPORTION (Prevalence IS NOT A RATIO): Numerator is a part of denominator and is always expressed in percentage.
- *Prevalence of few important infections in India*:

Infection	Prevalence (India) [2011]
Tuberculosis infection	40%
HIV infection	0.27%

54. Ans. (a) Number of new cases *[Ref. Park 23/e p60]*

55. Ans. (c) Only new cases *[Ref. Park 23/e p60]*

56. Ans. (a) The product of incidence and mean duration of disease *[Ref. Park 23/e p61]*

57. Ans. (b) Cross-sectional study *[Ref. Park 23/e p69]*

58. Ans. (a) 240 *[Ref. K. Park 23/e p61-62]*

59. Ans. (b) 0.02 *[Ref. K. Park 23/e p58]*

60. Ans. (a) No affected by duration *[Ref. K. Park 23/e p60]*

61. Ans. (c) 13% *[Ref. K. Park 23/e p61-62]*

62. Ans. (d) Incidence *[Ref. Park 23/e p61]*

USES OF INCIDENCE

- Control of disease
- Research into etiology & pathogenesis, distribution and efficacy of preventive and therapeutic measures

63. Ans. (a) Point prevalence rate *[Ref. Park 23/e p61]*

64. Ans. (d) Incidence same, prevalence increases *[Ref. Park 23/e p60-61]*

- A drug reduces mortality but does not cure a disease, so it will lead to accumulation of old cases (cases are not cured so remain cases) while new cases will keep on occurring at same rate
- Thus Incidence (new cases) remains same while prevalence (new cases + old cases) will increase gradually
- Examples of such drugs: Anti-retro virals (for HIV/AIDS), Anti-cancer drugs, Anti-hypertensive drugs, Anti-diabetic drugs

Review Questions

65. Ans. (a) Incidence of the disease *[Ref. 23/e p60]*

66. Ans. (b) Prospective study *[Ref. Park 23/e p76]*

67. Ans. (a) Cohort study *[Ref. Park 23/e p75]*

68. Ans. (c) Measles is more infectious than mumps *[Ref. Park 23/e p100]*

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69. **Ans. (c) Secondary attack rate** *[Ref. Park 23/e p100]*

70. **Ans. (c) Longer duration of disease** *[Ref. Park 23/e p61-62]*

DESCRIPTIVE EPIDEMIOLOGY

71. **Ans. (d) Secular trends** *[Ref. Park 23/e p66]*

72. **Ans. (c) Person-to-person transmission** *[Ref. Park 23/e p61]*

EPIDEMIC:

- *Definitions of epidemic*:
  - Occurrence of no. of cases of a disease *'clearly in excess of normal expectancy (NE)'*
    1. Normal expectancy is derived by looking at average of no. of cases of the disease in previous 3 – 5 years in that geographical area
    2. If NE = zero, 'even one case is considered epidemic'
  - Statistically speaking, epidemic is when no. of cases *'exceed twice the standard deviation'*
    No. of cases > Mean + 2SD ($>\mu + 2\sigma$)
  - Occurrence of a new disease in a population (as NE = Zero)
  - Reoccurrence of an eliminated/ eradicated disease in a population (as NE = Zero)
- *Types of Epidemics: Refer to theory.*

Also Remember

- *Epidemic curve:* Is drawn between no. of cases in epidemic and time elapsed (time distribution of epidemic cares)

73. **Ans. (c) All cases occur in a single incubation period of the disease** *[Ref. Park 23/e p64]*

Also Remember

- *Endemic*: Constant presence of a disease or infectious agent in a defined geographical area
- *Pandemic*: An epidemic usually affecting a large proportion of the population, occurring over a large geographical area such as part of a nation, nation, continent or world
- *Sporadic*: Cases which are *'scattered about'*
  - Cases are widely separated in space and time
  - Show little or no connection with each other
  - There is no recognizable source of infection

74. **Ans. (a) Rapid rise and fall; (c) Explosive; (e) No secondary wave** *[Ref. Park 23/e p64]*

75. **Ans. (a) Long term changes** *[Ref. Park 23/e p66]*

76. **Ans. (a) Progressive changes occurring over a long period of time** *[Ref. K. Park 23/e p66]*

77. **Ans. (b) Prospective cohort** *[Ref. K. Park 23/e p74]*

78. **Ans. (c) Environmental and genetic factors in a disease in population** *[Ref. Park 23/e p67-68]*

MIGRATION STUDIES

- Use: Evaluation of role of possible Genetic and Environmental factors in occurrence of a disease in a population
- Study design: Comparison of Disease rates & Death rates of,
  - Migrants with Kin who stayed at home
  - Migrants with Local population of host country
- Limitations:
  - Non-random assignment to Groups: Migrants are self-selected
  - Environmental factors may act at certain age/point only
  - Not useful for disease with long incubation period

79. **Ans. (d) Multiple sources for a prolonged period** *[Ref. Park 23/e p65]*

Review Questions

80. **Ans. (a) Point Source epidemic** *[Ref. Park 23/e p64]*

81. **Ans. (a) Seasonal variation of disease occurrence may be related to environmental conditions** *[Ref. Park 23/e p65]*

82. **Ans. (a) Retrospective and prospective study** *[Ref. Park 23/e p71, 76]*

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83. Ans. (b) Pointed epidemic *[Ref. Park 23/e p64]*

84. Ans. (c) Plateau is seen *[Ref. Park 23/e p64]*

85. Ans. (a) Common source, single exposure epidemic *[Ref. Park 23/e p64]*

86. Ans. (c) Changes occurs over decades in particular direction *[Ref. Park 23/e p66]*

87. Ans. (a) Point source epidemic, single exposure *[Ref. Park 23/e p64]*

88. Ans. (d) Consistent change in one direction *[Ref. Park 23/e p66]*

89. Ans. (b) Cyclic trend *[Ref. Park 23/e p65]*

ANALYTICAL EPIDEMIOLOGY

90. Ans. (c) Ethical considerations *[Ref. Park 23/e p73-83]*

- *Bias*: Is any systematic error in an epidemiological study, occurring during data collection, compilation, analysis and interpretation
- *Some important types of biases in epidemiological studies: Refer to Theory*
- *Minimization of biases in epidemiological studies*:
  - *Blinding*:

Type	Method	Minimizes
Single blinding	Study subjects are not aware of the treatment they are receiving	Subject bias
Double blinding	Study subjects as well as investigator are not aware of the treatment study subjects are receiving	Subject bias + Investigator bias
Triple blinding	Study subjects, investigator as well as analyzer are not aware of the treatment study subjects are receiving	Subject bias + Investigator bias + Analyzer bias

  - *Randomization*: in Randomized Controlled trial (RCT) is a statistical procedure by which participants are allocated into either of two groups, viz., *'Experimental Group'* (in which intervention is given) and *'Reference Group'* (in which intervention is not given) to ensure elimination of selection Bias.

Also Remember

- Berkesonian bias is a type of selection bias
- *Confounding is not strictly a type of bias*: (Confounding is removed by matching)
  - It does not result from systematic error in research designs
  - It arises due to non-random distribution of risk factors in source population also occurs in study population
- *Methods used to control confounding*:

Method	Utility to control confounding
Randomization	*Most ideal method*
Restriction	Limiting study to people who have particular characteristics
Matching	Mostly useful in case control studies
Stratification	Useful for larger studies
Statistical modeling	When many confounding variables exist simultaneously

- *Randomization is superior to BOTH matching and blinding:*

Technique	Removes or minimizes
Matching	Known confounding factors
Binding	BIAS
Single blinding	Subject bias
Double blinding	Subject bias + Investigator bias
Triple blinding	Subject bias + Investigator bias + Analyzer bias
Randomisation	Known confounding factors
	Unknown confounding factors

- Randomisation is known as *'Heart of a trial'*
- *Open trial*: A trial without blinding; thus is full of biases

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91. Ans. (c) Recall bias *[Ref. Park 23/e p73]*

- *In a Nested case control study*, interviews are performed at the beginning of the study (at baseline), and data are obtained before the disease has developed, thereby eliminating the problem of Recall bias

92. Ans. (b) Relative risk *[Ref. Park 23/e p73]*

- *Strength of association in a cohort study is evaluated by*:
  - Relative risk (RR)
  - Attributable risk (AR)
  - Population attributable risk (PAR)
- *Relative risk (RR)* = $\frac{\text{Incidence among exposed}}{\text{Incidence among non-exposed}}$

$$RR = \frac{I_{exp}}{I_{nonexp}}$$

  - *Interpretation of RR*: Incidence of disease among exposed IS SO MANY TIMES HIGHER as compared to that among non-exposed
- *Attributable risk (AR)* = $\frac{\text{Incidence among exposed–Incidence among non-exposed}}{\text{Incidence among exposed}}$

$$AR = \frac{I_{exp} - I_{nonexp}}{I_{exp}} \times 100$$

  - *Interpretation of AR*: So much disease can be attributed to exposure
- *Population attributable risk (PAR)* = $\frac{\text{Incidence among total–Incidence among non-exposed}}{\text{Incidence among total}}$

$$PAR = \frac{I_{tot} - I_{nonexp}}{I_{tot}} \times 100$$

  - *Interpretation of PAR*: If risk factor is modified or eliminated, there will be so much reduction in incidence of disease in the given population

Also Remember

- Relative risk (RR) is of importance to clinician, whereas Population attributable risk (PAR) is of importance to public health programme manager/ epidemiologist
- *Relative risk (RR) Versus Odds Ratio (OR)*:

	Relative risk (RR)	Odds Ratio (OR)
Synonyms	Risk ratio	Cross product ratio
Utility	Estimates strength of association in a cohort study	Estimates strength of association in a case control study
Measure of strength of association	More accurate estimate	Less accurate (only an estimate of RR)
Calculation	Iexposed/ Inon-exposed	ad/ bc

93. Ans. (b) cohort study *[Ref. Textbook in Psychiatric Epidemiology; p10 and A Dictionary of Public Health, Dr. Jugal Kishore; p423-24]*

- ATTENTION BIAS (HAWTHORNE EFFECT):
  - *Is a type of subject bias*
  - Study subjects systematically alter their behaviour when they know they are being observed

94. Ans. (d) Case control *[Ref. Park 23/e p71]*

In the given question, a study compared 150 children with a particular disease with 300 disease free children to examine past experiences that may contribute to the development of the illness,

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Since two groups, one diseased (cases) and one group of disease-free children (controls) are examined about past experiences (exposure), it is a retrospective design, i.e. Case control study.

Also Remember

- *In a case control study, selection of controls is a prerequisite*:
  - If the study group is small, choose up to 4 controls per case (In larger studies with equal cost to collect cases and controls 1 : 1 is sufficient)
  - Controls must be similar to cases, as much as possible except for the absence of disease under study
  - Choice of cases and controls must not be influenced by exposure status
  - Failure to select comparable controls can lead to biases

95. Ans. (d) Random error *[Ref. Basic Epidemiology by Beaglehole, WHO; p46-52, Park 22/e p47-53]*

POTENTIAL ERRORS IN EPIDEMIOLOGICAL STUDIES:

- *Random errors*:
  - Also known as *'Sampling errors'*: Is *'divergence due to chance alone'* of an observation on a sample from the true population value, leading to *'lack of precision'* in the measurement of association
  - Random error *'cannot be completely eliminated'*
  - *Random errors can be reduced by*: careful measurement of exposure and outcome, thus making the individual measurements as precise as possible
  - *Best way of reducing sampling errors (increasing precision)*: Increase the sample size in the study
- *Systematic errors*:
  - Also known as *'Biases'*: occur whenever there is a tendency to produce results that differ in systematic manner from the true values (Bias is any systematic error in an epidemiological study, occurring during data collection, compilation, analysis and interpretation)

96. Ans. (a) 25% *[Ref. Park 23/e p78]*

- *Relative Risk* (RISK RATIO) is used to estimate risk of disease (calculated as incidence of that disease) with exposure to a factor
- Relative Risk (RR) = Incidence among exposed/ Incidence among non-exposed

In the given question,

	Breast Cancer	No Breast Cancer	Total
Placebo	40	960	1000
New Drug	10	960	1000

Thus, considering new drug as exposure (placebo as non-exposure) and development of breast cancer as disease,

I_{exp} = × 1000 = 10 per 1000

$I_{non\text{-}exp}$ = × 1000 = 40 per 1000

Thus, RR = I_{exp}/ $I_{non\text{-}exp}$ = 0.25

(25%; ideally RR is a ratio – MUST NOT be expressed as percentage)

Interpretation: New drug is efficacious in prevention of breast cancer; new drug is protective for breast cancer

97. Ans. (c) Concurrent cohort study *[Ref. Park 23/e p75, 76]*

- *Prospective cohort study*:
  1. Known as *'Current cohort study'* or *'Concurrent cohort study'*
  2. *Outcome has not yet occurred when the study has begun*: Only exposure has occurred; we look for development of same disease in both exposed and non-exposed groups
  3. Examples:
     i. Framingham heart study
     ii. Doll & Hills prospective study on smoking and lung cancer

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Also Remember

- Exposure and outcome in analytical studies:

	Exposure	Outcome	Remarks	Direction
Prospective cohort study	Occurred	Followed-up	Start with exposure	Forward looking
Retrospective cohort study	Occurred	Occurred	Start with exposure	Forward looking
Mixed cohort study	Occurred	Occurred; further assessed in future	Start with exposure	Forward looking
Case control study	Occurred	Occurred	Start with outcome	Backward looking
Cross sectional study	Occurred	Occurred	Both exposure and outcome assessed at a point of time	Neither forward looking nor backward looking

98. Ans. (b) 10 *[Ref. Park 23/e p78]*

- *Relative Risk* (RISK RATIO) is used to estimate risk of disease (calculated as incidence of that disease) with exposure to a factor
- Relative Risk (RR) = Incidence among exposed/ Incidence among non-exposed
  RR = I_{exp}/ $I_{non\text{-}exp}$

In the given question, TATA memorial hospital conducted a cohort study on 7000 subjects who were smokers over a ten-year period & found 70 subjects developed lung cancer,

Thus, I_{exp} = × 1000 = 10 per thousand

Also, concurrent evaluation of general population in the catchment area of hospital, out of 7000 non-smoker subjects only 7 developed lung cancer,

Thus, $I_{non\text{-}exp}$ = × 1000 = 1 per 1000

Therefore, RR = = 10 per 1000/ 1 per 1000 = 10

Interpretation: Strength of association between smoking and lung cancer is 10 (Lung cancer is 10 times more common among smokers as compared to non-smokers)

HAD RR BEING 1, it would have implied that exposure (smoking) and disease under study (lung cancer) are not associated at all (Smoking is neither causative nor protective for lung cancer)

HAD RR BEING < 1, it would have implied that exposure (smoking) is protective for the disease under study (lung cancer)

Also Remember

- Attributable risk (AR):
  - *Is a good measure of extent of public health problem caused by the exposure*
  - *Is a useful tool for assessing priorities for health action*
  - Is also known as 'Absolute risk' or 'excess risk' or 'risk difference'

99. Ans. (c) 6.0 *[Ref. Park 23/e p73]*

- *Strength of association in a case control study*: Case Control Study cannot provide with incidences, so Relative Risk cannot be calculated; so in a Case Control Study, we calculate *'an estimate of Relative Risk'*, known as *'Odds Ratio'* (CROSS PRODUCT RATIO)
- *CORRECT TABLE CONSTRUCTION in a case control study*: Table will have disease at the top (row) and history of exposure/ risk factor on the left (column)
- *Odds Ratio In a 2 × 2 table for a case control study*:

	Disease Present	Disease Absent
Exposure present	a	b
Exposure absent	c	d

Odds Ratio (Cross Product Ratio) = ad/bc

- **Thus in the given question**, correct table IS TO BE CONSTRUCTED FIRST:

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	Renal cell cancer Present (cases)	Renal cell cancer Absent (controls)
Exposure to smoking present Exposure to smoking absent	a c	b d
Total	**a + c**	**b + d**

Now, total cases of renal cell cancer (a + c) = 50, smoking exposure present (a) = 30
Total controls (b + d) = 50, smoking exposure present (b) = 10
Therefore, c = [(a + c) – (a)] = [50 – 30] = 20 and,
d = [(b + d) – (b)] = [50 – 10] = 40
Table construction,

	Renal cell cancer Present (cases)	Renal cell cancer Absent (controls)
Exposure to smoking present *Exposure to smoking absent*	30 20	10 40
Total	**50**	**50**

Odds ratio = ad/bc = 30 × 40/20 × 10 = 6

***Interpretation of Odds ratio* = 6:** Renal cell cancer cases have 6 times higher odds than controls of having had the history of exposure to smoking

Also Remember

- *Interpretation of Odds ratios (OR)*: Is similar to Relative risk (RR) in cohort study (as OR is an estimate of RR)
  - OR > 1: Cases have so-many times higher odds than controls of having had the history of exposure under study
  - OR = 1: Cases have equal odds as controls of having had the history of exposure under study; thus exposure IS NOT ASSOCIATED with disease under study
  - OR < 1: Cases have so-many times lesser odds as controls of having had the history of exposure under study; thus exposure IS PROTECTIVE for the disease under study

100. Ans. (b) Known confounding *[Ref. Park 23/e p72]*

- *Confounding*: Any factor associated with both exposure and outcome, and has an independent effect in causation of outcome is a confounder
- *Matching*: Process of selecting controls in a such a way that they are similar to cases (with regard to certain pertinent selected variables which may influence the outcome of disease, thereby distorting the results)
  - *Matching eliminates confounding*: Matching distributes known confounding factors equally in two groups
- *Types of matching*:
  - *Caliper matching*: Process of matching comparison group subjects to study group subjects within a specified distance for a continuous variable (matching age to within 2 years)
  - *Frequency matching*: Frequency distributions of matched variable(s) are similar in study and comparison groups
  - *Category matching*: Process of matching study and control group subjects in broad classes (e.g. occupational groups)
  - *Individual matching*: Relies on identifying individual subjects for comparison, each resembling a study subject for matched variable(s)
  - *Pair matching*: Individual matching in which study & comparison subjects are paired

101. Ans. (d) 6 *[Ref. Park 23/e p73]*

- *Relative Risk* (RISK RATIO) is used to estimate risk of disease (calculated as incidence of that disease) with exposure to a factor
- Relative Risk (RR) = Incidence among exposed/ Incidence among non-exposed

In the given question, 200 smokers & 300 non-smokers were followed up over a period of 10 yrs to find out incidence of hypertension,
Out of 200 smokers, 60 developed hypertension, thus Iexp = 60/ 200 × 1000 = 300
And, out of 600 non-smokers, 30 developed hypertension, thus Inon-exp = 30/ 600 × 1000 = 50

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Thus, Risk ratio = $I_{exp}/I_{non\text{-}exp}$ = 300/50 = 6
Interpretation: Strength of association between smoking and hypertension is 6 (Hypertension is 6 times more common among smokers as compared to non-smokers)

102. Ans. (b) Concurrent cohort *[Ref. Epidemiology by Leon Gordis, 4/e p152 and Park 23/e p76]*
In the given question, a study began in 1965, a group of 3000 adults in Baltimore were asked about alcohol consumption and the occurrence of cancer was studied in the group between 1981 and 1995,
Since risk factor/ exposure (alcohol consumption) was assessed first (1965) and then development of disease was noted in due course of time (followed-up till 1981-1995),
Thus it is a Concurrent cohort study

Also Remember

- *Preference of epidemiological studies for establishing causality*:
  - 1st preference: Meta-analysis
  - 2nd preference: Randomised controlled trials (RCTs)
  - 3rd preference: Retrospective (Non-concurrent/ Historical) cohort study
  - 4th preference: Prospective cohort study (Concurrent cohort study)
  - 5th preference: Case control study
  - 6th preference: Cross-sectional study
  - 7th preference: Ecological study
- *Examples* of concurrent cohort study:
  - Framingham heart study
  - Doll & Hills prospective study on smoking and lung cancer

103. Ans. (c) Retrospective cohort *[Ref. Epidemiology by Leon Gordis, 4/e p152-53 and Park 23/e p76]*
In the given question, the physical examination records of the entire incoming freshman class of 1935 at the university of Minnesota were examined in 1977 to see if their recorded height and weight at the time of admission to university was related to their chance of developing CHD.
Since both exposure (Weight and height) as well as outcome (CHD) have occurred when the study has begun AND first they went back in time and take only exposure into consideration (height, weight from past hospital/ college records), then looked for development of same disease (CHD) in both exposed and non-exposed groups.
Thus it is a Retrospective cohort study.

104. Ans. (c) The required sample size is smaller than that needed for a concurrent cohort study *[Ref. Epidemiology by Leon Gordis, 4/e p152-53]*

105. Ans. (d) Incorrect, because of failure to distinguish between incidence and prevalence *[Ref. Park 23/e p60-61]*
In the given question, during an initial examination in Oxford, Migraine head ache was found in 5 of 1000 men aged 30-35yrs and in 10 of 1000 women aged 30 to 35 yrs
Thus, information provided does not distinguish between incidence and prevalence of migraine headache,
Therefore, we cannot infer that women have a two times greater risk of developing migraine headache than men in this age group [for drawing that condusion, a cohort study must be undertaken]

Also Remember

- *Incidence is the best measure of disease frequency in etiological studies*
- *Incidence can be determined from*: Cohort study
- *Prevalence can be determined from*: Cross Sectional Study

106. Ans. (b) Relative risk can be calculated *[Ref. Park 23/e p73, 78]*
- Relative risk calculation requires incidences, which can be found only through cohort studies
- In Case Control Studies, we calculate *'an estimate of relative risk: Odds Ratio'*

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Also Remember

- *Cohort studies versus Case control studies*:

	Cohort Studies	Case Control Studies
Before start Synonyms	Only exposure has occurred Prospective study Forward looking study Cause to effect study Exposure to outcome study Risk factor to disease study Incidence study Follow up study	Both exposure as well as outcome have occurred Retrospective study Backward looking study Effect to cause to study Outcome to exposure study Disease to risk factor study TROHOC study
Advantages	Provides Incidence, Relative risk Allows study of several etiological factors simultaneously	Easy to carry out Inexpensive Rapid No risk to subjects Minimal ethical problems No loss to follow up (No Attrition) Particularly suitable to investigate rare diseases
Disadvantages	Ethical problems Loss to follow up (attrition) Time consuming Expensive Not suitable to investigate rare diseases	Selection of an appropriate control-group may be difficult Cannot measure incidence Can only estimate Odds ratio

  - Maximum allowable attrition rate in a cohort study for valid results: 5% (Thus Ideal retention rate in a Cohort study: > 95%)
  - COHORT STUDY IS BETTER THAN A CASE CONTROL STUDY (despite problems of ethics, attrition, expensive & time-consuming): As Relative risk (RR) is a better estimate of strength of association than Odds ratio (OR)

107. Ans. (a) Give good information about the patients in that hospital at that time *[Ref. Park 23/e p69]*

In the given question, a one day census of inpatients in a mental hospital is carried out AT A POINT OF TIME,

Thus it is a cross-sectional study (neither forward looking, nor backward looking

Being a cross-sectional study, it can provide good information about the patients in that hospital at that time (Is a snapshot of the population, provides prevalence BUT cannot establish causality)

It cannot give reliable estimates of seasonal factors in admissions (since it is done only in a day), for which a longitudinal study design is preferable (as latter can cover all seasons)

It would not enable us to draw conclusions about the mental hospitals of India, as it is being done in only one hospital for only one day

It also would not enable us to estimate the distribution of different diagnosis in mental illness in the local area, as it is being done for only inpatients (Not OPD patients) and only for a day

108. Ans. (d) 80% *[Ref. Park 23/e p78]*

- AR calculation requires incidence which can be obtained from only a cohort study (Not from a case control study).
- *Is a good measure of extent of public health problem caused by the exposure*
- Is a useful tool for assessing priorities for health action
- Is also known as '*Absolute risk*' or '*excess risk*' or 'risk difference'

In the given question,

Exposure is multiple sexual partners (and non-exposure is a single sex partner)

If incidence of carcinoma cervix (disease) among non-exposed (single sex partner) is 'x',

Then, incidence of carcinoma cervix (disease) among exposed (multiple sex partners) is '5x',

Thus, AR = (5x – x)/5x × 100 = 80%

Interpretation of AR = 80%: 80% of carcinoma cervix (disease) can be attributed to exposure (multiple sex partners)

109. Ans. (c) 6.0 *[Ref. Park 23/e p73, 78]*

- *Relative Risk* (RISK RATIO) is used to estimate risk of disease (calculated as incidence of that disease) with exposure to a factor

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- Relative Risk (RR) = $\frac{\text{Incidence among exposed}}{\text{Incidence among non-exposed}}$ RR = $\frac{I_{exp}}{I_{non\ exp}}$

In the given question,

	Hypertension		
	Present	**Absent**	**Total**
Smoking present	120	280	**400**
Smoking absent	30	570	**600**
Total	**150**	**850**	1000

Exposed (smokers) = 400

Non-exposed (non-smokers) = 600

Incidence of hypertension in exposed (smokers) = $\frac{120}{400} \times 1000$

Incidence of hypertension in non-exposed (non-smokers) = $\frac{30}{600} \times 1000$

Thus, RR = $I_{exposed} / I_{non\text{-}exposed} = \frac{120/400 \times 1000}{30/600 \times 1000} = 6$

Interpretation of RR = 6: Smokers (exposed) have SIX times higher chances of development of Hypertension (disease) as compared to non-smokers (non-exposed)

110. Ans. (c) Attributable risk *[Ref. Park 23/e p78]*

In the given question, 85% of cases of lung Cancer are due to cigarette smoking, thus it is a measure of attributable risk.

Also Remember

- Attributable risk (AR):
  - Is a good measure of extent of public health problem caused by the exposure
  - Is a useful tool for assessing priorities for health action
  - Is also known as 'Absolute risk' or 'excess risk' or 'risk difference'
- Relative risk (RR) IS A BETTER ESTIMATE of strength of association than Attributable risk (AR)
- *Standardized mortality ration (SMR)*:
  - Is a special type of risk ratio: Comparison of observed mortality with expected mortality
  - Is a type of Indirect standardization

111. Ans. (b) Interviewer bias *[Ref. A Dictionary of Public Health, Dr. Jugal Kishore; p423-24]*

112. Ans. (a) 6.0 *[Ref. Park 23/e p73]*

113. Ans. (b) Cohort study *[Ref. Park 23/e p75]*

FRAMINGHAM HEART STUDY:

- *Is a classical example of cohort study*
- Initiated in 1948 by US Public Health Service at Framingham, a town in Massachusetts, USA
- *Aim*: To study the relationship of risk factors (serum cholesterol, blood pressure, weight, smoking) to the subsequent development of cardiovascular diseases
- *Age group*: 30 – 62 years
- *Sample size*: 5127 (4469 – 69% of the sample actually underwent first examination)
- *Method*: Multiple exposure were studied, as well as complex interactions among the exposures using multivariate techniques
- *Follow-up:*
  - Study population was examined every 2 years for 20 years
  - Daily surveillance of hospitalizations at only hospital at Framingham
- *Findings of study*:
  - Increasing risk of CHD with increasing age & more frequently in males

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- Hypertensive have a greater risk of CHD
- Elevated blood cholesterol level is associated with CHD
- Tobacco smoking and habitual use of alcohol are associated with increased risk of CHD
- Increased physical activity is associated with decrease in CHD development
- Increase in body weight is associated predisposes to CHD
- Diabetes mellitus increases risk of CHD

114. Ans. (d) A cohort study is more appropriate when the disease or exposure under investigation is rare, in comparison to case control study *[Ref. Park 23/e p75, 79]*

Also Remember

- *Potential biases in cohort studies*:
  - Bias in assessment of outcome
  - Information bias (esp. in retrospective cohort studies)
  - Bias from non-response and loss to follow up
  - Analytic bias
- *Longitudinal studies*:
  - Cohort study
  - Case control study

115. Ans. (c) Attributable risk *[Ref. Park 23/e p78]*

116. Ans. (d) A cohort study *[Ref. Park 23/e p75]*

117. Ans. (d) It is always >1 *[Ref. Epidemiology by Leon Gordis, 4/e p183-84]*

- *Odds ratio (OR)*: Ratio of odds that cases were exposed to a risk factor to the odds that the controls were exposed
  - Is used to *'measure strength of association in a case control study'*
  - Is also known as *'Cross product ratio'* or *'Relative odds'*
  - Is an *'estimate of Relative risk (RR)'*, which is used to measure strength of association in a cohort study
  - *'RR is more accurate than OR'* as a measure of strength of association
  - *OR calculation*: *CORRECT TABLE CONSTRUCTION in a case control study* requires that table will have disease at the top (row) and history of exposure/ risk factor on the left (column)

	Disease	
	Present (cases)	**Absent (controls)**
Exposure present	a →	→ b
Exposure absent	c →	→ d

Odds Ratio (Cross Product Ratio) = ad/bc

  - *Odds ratio is a good estimate of RR when the derivation of Odds ratio is based on 3 assumptions*:
    1. The disease being investigated must be relatively rare
    2. The cases must be representative of those with the disease
    3. The controls must be representative of those without the disease
  - *Interpretation of Odds ratio is just like relative risk*: OR can be >1 , = 1 or < 1

Odds ratio	INTERPRETATION	EXAMPLE	
		Risk /Exposure	**Disease**
OR > 1	So many times odds that cases were exposed to a risk factor is *more* to the odds that the controls were exposed **(Positive Association)**	OCPs	Thromboembolism
OR = 1	Odds that cases were exposed to a risk factor is same as the odds that the controls were exposed **(No Association)**	Smoking	HIV/AIDS
OR < 1	So many times odds that cases were exposed to a risk factor *is less than* the odds that the controls were exposed **(Negative Association)**	Regular physical activity	CHD

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- *Relationship between odds and probability of developing a disease*:

$$\text{Odds} = \frac{\text{Probability}}{1 - \text{Probability}}, \text{ and}$$

$$\text{Probability} = \frac{\text{Odds}}{1 + \text{Odds}}$$

118. Ans. (d) Does not exist *[Ref. Epidemiology by Leon Gordis, 4/e p183-84]*

119. Ans. (d) Interviewer bias *[Ref. A Dictionary of Public Health, Dr. Jugal Kishore; p284]*

- *INTERVIEWER BIAS*: Systematic error due to interviewer's subconscious or conscious gathering of selective data
  1. Is a type of information bias
  2. Is a type of investigator bias
  3. Commonly occurs due to interviewer devoting more time of interview with cases as compared to controls
  4. Can be eliminated/ reduced by devoting equal interview time to cases as well as controls

120. Ans. (c) Stratified randomization *[Ref. Epidemiology by Leon Gordis, 4/e p183-84]*

- *Stratified randomization*: Study population is *'first stratified'* by each variable which is considered important, and then randomization is done to each treatment groups within each stratum
  - Comparison groups become similar as possible as regards participant characteristics that might influence the response to the intervention
  - Equal numbers of participants with a characteristic thought to affect prognosis or response to the intervention will be allocated to each comparison group.
  - Stratification increase the likelihood that two groups will be more comparable
  - Stratified randomization is performed by
    1. Performing separate randomization for each strata
    2. By using minimization

121. Ans. (b) Sibling Controls *[Ref. Park 23/e p71]*

CONTROLS IN A CASE CONTROL STUDY:

- In a case control study, selection of controls is a prerequisite
- If the study group is small, choose up to 4 controls per case (In larger studies with equal cost to collect cases and controls 1 : 1 is sufficient).
- Cases are diseased individuals, Controls are those free from the disease under study
- Controls must be similar to cases, as much as possible except for the absence of disease under study
- *Sources of controls*:
  - *Hospital controls*: are often a *'source of selection bias'*
  - *Neighbourhood controls*: provide similar socio-economic and living conditions
  - *Relatives*: Sibling controls are unsuitable in genetic studies
  - *General population*: by choosing a random sample
  - *Best friends controls*

Also Remember

- *Historical controls*:
  - Used in a study of new therapy; especially when disease is uniformly fatal and a new drug becomes available
  - 'Comparison group is selected from the past', usually from records of patients with same disease who were treated before new therapy became available
  - Disadvantages:
    1. Need meticulous system of data collection of patients
    2. Quality of data collected is usually not comparable
    3. One is not sure if difference is due to therapy only
- *Matching*: Is selection of controls so that they are similar to cases in various respects
  - Matching is done to 'eliminate known confounding'
  - Cases and controls are matched for every factor 'except risk factor under study'

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122. Ans. (d) Suitable to investigate rare diseases *[Ref. Park 23/e p71]*

- *If there is a rare disease to be studied, and,*
  - *Cohort study is done*: One may get very few cases or no case at the end of study (as disease is rare); this will be wastage of time and money
  - *Case control study is done*: Controls are chosen for the few available cases and history of possible/ suspected exposure(s) is explored

123. Ans. (b) 6 *[Ref. Park 23/e p73]*

- *Strength of association in a case control study*: Case Control Study cannot provide with incidences, so Relative Risk cannot be calculated; so in a Case Control Study, we calculate *'an estimate of Relative Risk'*, known as *'Odds Ratio'* (CROSS PRODUCT RATIO)
- *CORRECT TABLE CONSTRUCTION in a case control study*: Table will have disease at the top (row) and history of exposure/ risk factor on the left (column)
  Odds Ratio (Cross Product Ratio) = ad/bc
- **Thus in the given question**, correct table IS NOT GIVEN; correct construction of table is required first

	Thromboembolism Present (cases)	Thromboembolism Absent (controls)
Exposure to OCPs present *Exposure to OCPs absent*	a c	b d
Total	**a + c**	**b + d**

Now, total cases (a + c) = 84, OCP exposure present (a) = 50% of 84 = 42

Total controls (b + d) = 168, OCP exposure present (b) = 14% of 168 = 24

Therefore, c = [(a + c) – (a)] = [84 – 42] = 42 and,

d = [(b + d) – (b)] = [168 – 24] = 144

Table construction,

	Thromboembolism Present (cases)	Thromboembolism Absent (controls)
Exposure to OCPs present *Exposure to OCPs absent*	42 42	24 144
Total	**84**	**168**

Odds ratio = ad/ bc = 42 × 144/ 24 × 42 = 6

Interpretation of Odds ratio = 6: Thromboembolic cases have 6 times higher odds than controls of having had the history of exposure to OCPs.

124. Ans. (b) 90% *[Ref. Park 23/e p78]*

- **In the given data,**
  - Incidence among exposed (Iexp) = 10/1000
  - Incidence among non-exposed (Inonexp) = 1/1000
  - Incidence among total (Itot) = 11/1000
- *Relative risk (RR)* = $\frac{I_{exp}}{I_{non\ exp}} = 10$
  - *Interpretation of RR*: Incidence of lung cancer (disease) among smokers (exposed) IS TEN TIMES HIGHER as compared to that among non-smokers (non-exposed)
- *Attributable risk (AR)* = $(I_{exp} - I_{nonexp})/ I_{exp} \times 100 = 90\%$
  - *Interpretation of AR*: 90% of lung cancer (disease) can be attributed to smoking (exposure)
- *Population attributable risk (PAR)* = PAR = $(I_{tot} - I_{nonexp})/ I_{tot} \times 100 = 91\%$
  - *Interpretation of PAR*: If smoking (risk factor) is modified or eliminated, there will be 91% reduction in incidence of lung cancer (disease) in the given population
- Relative risk (RR) is of importance to clinician, whereas Population attributable risk (PAR) is of importance to public health programme manager/ epidemiologist
- *Absolute risk*: Is *'attributable risk'* or *'excess risk'* or *'risk difference'*
  - Is a useful measure of extent of public health problem caused by an exposure

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125. Ans. (d) Ecological studies *[Ref. Park 21/e p59, Park 22/e p60]*

126. Ans. (b) A – III, B – II, C – IV, D – I *[Ref. Park 21/e p59, Park 22/e p60, and Basic Epidemiology by Beaglehole, WHO; p31]*

127. Ans. (d) The attributable risk of breast cancer resulting from the pill may be directly measured *[Ref. Park 23/e p78]*

AR calculation requires incidence which can be obtained from only a cohort study (Not from a case control study)

- In a Case Control Study, *'Cases' are diseased and 'Controls' are healthy*
- Controls should be similar to Cases in all respects (for ensuring comparability)
- Cases should be matched with controls for all factors *'EXCEPT for the (risk) factor under study'* (otherwise the etiological role of risk factor under study, which we are studying, would be eliminated from the study, since both groups are exactly similar in all respects); So if controls do not exclude women known to be taking the pill at the time of the survey, both groups will become similar in respect to risk factor (contraceptive pill) under study and no relationship can be established with breast cancer

128. Ans. (c) Done when incidence of disease is very low among exposed *[Ref. Park 23/e p75-79]*

- *Case control study is preferable for rare diseases*: Cohort study IS NOT USEFUL to investigate rare diseases as whole time, and expense may yield little/ no disease, thus strength of association may not be calculable
- COHORT STUDY IS BETTER THAN A CASE CONTROL STUDY (despite problems of ethics, attrition, expensive & time-consuming): As Relative risk (RR) is a better estimate of strength of association than Odds ratio (OR)

129. Ans. (d) 2.25 *[Ref. Park 23/e p73]*

Thus in the given question,

Odds Ratio = 30 × 30/ 20 × 20 = 2.25

130. Ans. (b) Beta carotene is not protective in lung cancer *[Ref. Park 23/e p73, 78]*

- *Relative Risk* (RISK RATIO) is used to estimate risk of disease (calculated as incidence of that disease) with exposure to a factor
- Relative Risk (RR) = Iexp/Inonexp

In the given question,

Exposure is beta carotene and disease is lung cancer
Incidence of lung cancer among those exposed to beta carotene (I_{exp}) = 3/6000
Incidence of lung cancer among those not exposed to beta carotene (I_{nonexp}) = 2/4000
Therefore, RR = = 1 (i.e., I_{exp} IS SAME AS I_{nonexp})
If RR = 1, it implies 'Incidence among exposed' IS SAME AS 'Incidence among non-exposed'. Therefore, whether the person is exposed or not (to a factor), incidence of disease developing later will remain the same. Thus, exposure (beta carotene) and disease under study (lung cancer) are not associated at all.

Thus *'Beta carotene is neither causative nor protective for lung cancer'*

Also Remember

- With a *large sample size* (10000 study subjects) this cohort study is sufficient to draw meaningful conclusions

131. Ans. (c) No association at all *[Ref. Park 23/e p73, 78]*

- *Relative Risk* (RISK RATIO) is used to estimate risk of disease (calculated as incidence of that disease) with exposure to a factor
- Relative Risk (RR) = $\frac{\text{Incidence among exposed}}{\text{Incidence among non - exposed RR}} = \frac{I_{exp}}{I_{nonexp}}$
- RR measures 'Strength of Association' between risk factor and disease under study
  - If RR > 1, it implies incidence among exposed is SO MANY TIMES more than incidence among non-exposed. Thus non-exposed also have a risk of disease (Incidence among non-exposed) but risk increases with exposure
  - If RR = 1, it implies 'Incidence among exposed' IS SAME AS 'Incidence among non-exposed'. Therefore, whether the person is exposed or not (to a factor), incidence of disease developing later will remain the same. Thus, exposure and disease under study are not associated at all. For example, Milk consumption and Lung cancer

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RELATIVE RISK		INTERPRETATION	EXAMPLE	
			Risk Factor/ Exposure	Disease
RR > 1	$I_{exp} > I_{nonexp}$	So many times chances/incidence of disease development is more among exposed as compared to non-exposed **(Positive Association)**	Smoking	Lung Cancer
RR = 1	$I_{exp} = I_{nonexp}$	Chances/incidence of disease development is same among exposed as compared to non-exposed **(No Association)**	Smoking	HIV/AIDS
RR < 1	$I_{exp} < I_{nonexp}$	Chances/incidence of disease development is less among exposed as compared to non-exposed **(Negative Association)**	Vitamin-A intake	Epithelial cancers

- RR < 1 is possible. It implies, incidence among non-exposed is more than incidence among exposed. Thus factor/ exposure is NOT CAUSATIVE, rather protective for the disease. For example, Vitamin-A as exposure and development of Epithelial cancers as disease

Also Remember

- Relative risk can ONLY be determined exactly from a Cohort Study
- Case Control Study cannot provide with incidences, so Relative Risk cannot be calculated. So in a Case Control Study, we calculate *'an estimate of Relative Risk'*, known as *'Odds Ratio'* (CROSS PRODUCT RATIO)

132. Ans. (a) Strength of association between suspected cause and effect *[Ref. Park 23/e p73, 78]*

133. Ans. (c) Prospective *[Ref. Park 21/e p72, 73, Park 22/e p73, 74]*

134. Ans. (b) Randomisation is done while selecting subjects for the study *[Ref. Park 23/e p81-83]*

- *Randomisation* in Randomized Controlled trial (RCT) is a statistical procedure by which participants are allocated into either of two groups, viz., *'Experimental Group'* (in which intervention is given) and *'Reference Group'* (in which intervention is not given)
- *The essential purposes of randomization in a randomized controlled trial are*:
  - Participants have *'Equal and Known Chance'* of falling into either 'Experimental Group' or 'Reference Group'
  - To *eliminate Selection Bias* (Selection Bias or *'Susceptibility Bias'* is the bias due to differential susceptibility of two groups to outcome, even before intervention/experiment is performed; Thus two groups are not comparable)
  - To *ensure comparability* among two groups
  - To have *'similar prognostic factors'* among two groups
- *'Randomisation is done while dividing patients into the Experimental (Intervention) Group and the Reference Group'* AND not while selecting patients for RCT
- Randomisation is known as *'Heart of a trial'*
- *Randomisation IS SUPERIOR to Matching*:
  - Randomization ensures *'both known and unknown'* confounding factors are distributed equally among the two groups, thereby nullifying their effect on result (whereas matching is useful for only known confounding factors)
  - Randomization *'removes both confounding and bias'*

	Blinding	Matching	Randomization
Removes	Bias	Known confounding	Selection bias
			Known confounding
			Unknown confounding
Types	Single blinding	Caliper matching	Random number tables
	Double blinding	Frequency matching	Computer software
	Triple blinding	Category matching	Lottery Method
		Individual matching	
		Pair matching	

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Also Remember

- *Unit of study in RCT*: Patient
- *RCT is of two types*:
  - Concurrent parallel design: Comparisons are made between 2 groups:
    1. *Experimental group*: Is exposed to specific medication or intervention
    2. *Reference group*: Is not exposed to specific medication or intervention
  - Crossover design: Comparisons are made between 2 groups:
    1. *Experimental group*: Is exposed to specific medication or intervention
    2. *Reference group*: Is not exposed to specific medication or intervention

  Then the groups are crossed-over (exposed group now becomes non-exposed and vice-versa)
- Cross-over design RCT helps removing ethical concerns
- *Intention to treat trial*: Implies that the results of a RCT are unaffected by attrition (loss to follow up) or change over of study subjects from one group to another
- *Randomisation is best done by 'Random number tables'*
- Blinding removes Subject Bias *(Single Blinding)*; Subject Bias & Observer Bias *(Double Blinding)* or Subject Bias, Observer Bias & Analyzer Bias *(Triple Blinding)*
  - Double blinding is the most common form of blinding observed
  - OPEN TRIAL is a trial without blinding

135. Ans. (a) Helpful for evaluation of rare diseases; (e) Selection bias common *[Ref. Park 23/e p71-73]*

- *Case control study*:
  - Selection of an appropriate control group may be difficult
  - *Is prone to several biases*:
    1. Selection Bias
    2. Recall bias
    3. Survival bias
    4. Admission bias
    5. Non-response bias

136. Ans. (a) Proceeds from effect to cause; (b) Exposure already occured; (c) Odds ratio can be determined *[Ref. Park 23/e p71-75]*

137. Ans. (b) It is itself a risk factor for the disease *[Ref. Park 23/e p72]*

Confounding factor:

- It is found unequally distributed between the study and control groups
- Is associated with both exposure and outcome
- Has an independent effect in causation of outcome (thus is a risk factor itself)

138. Ans. (b) Prospective study *[Ref. Epidemiology by Leon Gordis, 4/e p172 and Basic Epidemiology by Beaglehole, WHO; p40-41]*

139. Ans. (a) Case control study *[Ref. Park 23/e p71]*

140. Ans. (b) Prospective study *[Ref. Park 23/e p76]*

141. Ans. (b) Blinding *[Ref. Park 22/e p69, 80 and Statistical modelling and Multivariate analysis by Lepik 1984, p1]*

- *Statistical modelling (for confounding control)*: Done by Multivariate analysis
- *Blinding*: Done for removal of types of Biases (subject, investigator, analyser)

142. Ans. (b) Ecological study *[Ref. Park 21/e p59, Park 22/e p60]*

ECOLOGICAL (CORRELATIONAL) STUDY:

- *Unit of study*: Population (results not applicable on individuals – *"Ecological fallacy"*)
- *Done in a small time frame*: inexpensive; use data that is already available
- *Inferior to Cohort, Case control studies*: Due to ecological fallacy

143. Ans. (a) Confounding factor *[Ref. Park 23/e p72]*

In the given question, BOTH exposure (beta-carotene) and outcome (carcinoma of colon) are associated with a third independent factor (dietary fiber). Thus dietary fiber may affect the results through confounding.

144. Ans. (c) Rare diseases *[Ref. Park 23/e p71]*

145. Ans. (c) 6.0 *[Ref. Park 23/e p78]*

146. Ans. (c) Ecological study *[Ref. Park 21/e p59, Park 22/e p60]*

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147. **Ans. (a) Case control study requires more time than cohort study** *[Ref. Park 23/e p79]*
148. **Ans. (b) Analytical study** *[Ref. K. Park 23/e p70]*
149. **Ans. (b) Ecological** *[Ref. K. Park 22/e p60]*
150. **Ans. (d) Prevalence study** *[Ref. K. Park 23/e p69]*
151. **Ans. (c) RCT** *[Ref. K. Park 23/e p81]*
152. **Ans. (b) 6** *[Ref. K. Park 23/e p73]*
153. **Ans. (c) Attributable risk cannot be calculated** *[Ref. K. Park 23/e p78]*
154. **Ans. (a) Useful for study of rare diseases; (d) Study multiple potential risk factors of a disease** *[Ref. K. Park 23/e p71]*
155. **Ans. (c) Confounding factor** *[Ref. K. Park 23/e p72]*
156. **Ans. (a) Selection bias** *[Ref. K. Park 23/e p73]*
157. **Ans. (a) Ecoloigical study** *[Ref. K. Park 22/e p67]*
158. **Ans. (d) All of the above** *[Ref. K. Park 23/e p72]*
159. **Ans. (b) Cohort study** *[Ref. K. Park 23/e p78]*
160. **Ans. (c) Risk difference between exposed and non-exposed** *[Ref. K. Park 23/e p78]*
161. **Ans. (c) Different rates of admission to hospital due to different diseases** *[Ref. K. Park 23/e p78]*
162. **Ans. (d) Associated with antecedent causation** *[Ref. Park 23/e p75]*
163. **Ans. (c) Estimate of amount of disease that can be reduced if risk factor is modified/eliminated** *[Ref. Park 23/e p78]*
164. **Ans. (d) Selection bias** *[Ref. Park 23/e p73]*
    - *Selection bias (Susceptibility bias)*: Groups to be compared are differentially susceptible to the outcome of interest, even before the experimental maneuver is performed
    - In the given question, Smokers and Non-smokers (Groups to be compared) may have different diet/exercise habits which may affect their Blood lipid levels (Outcome of interest), thus it'd lead to Selection bias
165. **Ans. (b) Effect modifier** *[Ref. Physical Activity Epidemiology by Dishman, 2/e p33]*
    - *Confounding factor*: Any factor associated with both exposure and outcome, and has an independent effect in causation of outcome is a confounder
        - It is found unequally distributed between the study and control groups
        - Example: Smoking is a confounding factor in a study estimating risk of Coffee consumption for Pancreatic cancer
    - *Mediator*: Third variable (mediator, M) carries the influence of a given risk factor to a given disease/outcome
        - Mediator comes in between the risk factor - disease continuum
        - *Example*: HPV is a mediator in a study estimating risk of Multiple sex partners for Cervical cancer
    - *Effect modifier* (Interactor): Third variable (Effect modifier) whose level determines the magnitude of effect in a study
        - It modifies Strength of association between exposure and outcome
        - Example: Asbestos is an effect modifier in a study estimating risk of Smoking for Lung cancer
    - *Collinearity*: Two independent factors are so highly correlated that it becomes difficult to distinguish their individual effect on disease/outcome
        - *Example*: Air pollution and Urban area residence exhibit collinearity for development of Lung cancer
166. **Ans. (b) Randomised controlled trials** *[Ref. Park 23/e p62]*

Review Questions

167. **Ans. (d) Less time consuming** *[Ref. Park 23/e p75]*
168. **Ans. (a) Risk among exposed/Risk among non-exposed** *[Ref. Park 23/e p78]*
169. **Ans. (b) Ecological** *[Ref. Park 21/e p59, Park 22/e p60]*
170. **Ans. (d) Field trials** *[Ref. Park 21/e p59, Park 22/e p60]*
171. **Ans. (b) Analytical study, (c) Longitudinal study** *[Ref. Park 21/e p59, Park 22/e p60]*
172. **Ans. (a) Confounding factors** *[Ref. Park 23/e p72]*
173. **Ans. (a) No association** *[Ref. Park 23/e p73, 78]*
174. **Ans. (d) Incidence among exposed/Incidence among Non-exposed** *[Ref. Park 23/e p73, 78]*

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175. **Ans. (a) Incidence of disease among exposed-incidence of among nonexposed × 100/Incidence rate among exposed** *[Ref. Park 21/e p74, Park 22/e p75]*
176. **Ans. (d) Starts with the disease** *[Ref. Park 23/e p75]*
177. **Ans. (a) Only odd's ratio** *[Ref. Park 23/e p73]*
178. **Ans. (d) Distinguishing between causes and associated factors** *[Ref. Park 23/e p71, 79]*
179. **Ans. (b) It is distributed equally in study & control groups** *[Ref. Park 23/e p72]*
180. **Ans. (b) Attributable risk** *[Ref. Park 23/e p78]*
181. **Ans. (b) Tells etiology** *[Ref. Park 23/e p69]*
182. **Ans. (a) Relative risk** *[Ref. Park 23/e p73, 78]*
183. **Ans. (a) Useful for rare diseases** *[Ref. Park 23/e p71, 79]*
184. **Ans. (d) Odds ratio** *[Ref. Park 23/e p73]*
185. **Ans. (d) 5** *[Ref. Park 23/e p73, 78]*
186. **Ans. (a) Strength of association between cause and effect** *[Ref. Park 23/e p78]*
187. **Ans. (a) Selection bias** *[Ref. Park 23/e p73]*
188. **Ans. (b) Chronic diseases can be studied** *[Ref. Park 23/e p69]*
189. **Ans. (c) Observation bias** *[Ref. Park 21/e p127, Park 22/e p130]*
190. **Ans. (a) Relative risk** *[Ref. Park 23/e p73, 78]*
191. **Ans. (a) ad/bc** *[Ref. Park 23/e p73]*
192. **Ans. (a) ad/bc** *[Ref. Park 23/e p73]*
193. **Ans. (a) Cohort study** *[Ref. Park 23/e p75]*
194. **Ans. (b) Incidence can be calculated** *[Ref. Park 23/e p75]*
195. **Ans. (a) Cohort** *[Ref. Park 23/e p75]*

EXPERIMENTAL EPIDEMIOLOGY

196. **Ans. (c) The patients do not know which treatment they are receiving** *[Ref. Park 23/e p83]*
197. **Ans. (d) The dropouts from the trial should be excluded from the analysis** *[Ref. The Medical Journal of Australia 2003, (79); 438-40]*
    - *Intention to treat trial*: Implies that the results of a RCT are unaffected by attrition (loss to follow up) or change over of study subjects from one group to another
        - The dropouts from the trial are not excluded from the analysis
        - Intention to treat analyses are done to avoid the effects of crossover and drop-out, which may break the randomization to the treatment groups in a study
        - Intention to treat analysis provides information about the potential effects of treatment policy rather than on the potential effects of specific treatment

Also Remember

- Blinding removes Subject Bias *(Single Blinding)*; Subject Bias & Observer/Investigator Bias *(Double Blinding)* or Subject Bias, Observer/Investigator Bias & Analyzer Bias *(Triple Blinding)*
- *RCT is done by allocation of all patients (units of study)in 2 groups*:
    - Experimental group: Is exposed to specific medication/intervention
    - Reference group: Is not exposed to specific medication/intervention
- *Sample size estimation depends upon*:
    - Prevalence of the disease in population under study
    - Error rate (precision level)
    - α-error and β-error
    - Power of test (1 – β)

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198. Ans. (c) It helps to eliminate alternative explanations for the results of the study *[Ref. Park 23/e p71]*

199. Ans. (a) To equalize the effects of extraneous variables, thus guarding against bias *[Ref. Park 23/e p82]*

Also Remember

- *Inferential statistics*: Includes inference about a population from a random sample drawn from it or, more generally, about a random process from its observed behavior during a finite period of time,
  - Point estimation
  - Interval estimation
  - Hypothesis testing (statistical significance testing)
  - Prediction
- *Placebo*: The placebo effect is a phenomenon in which a physiologically inert treatment, or placebo, improves a patient's condition relative to similar patients who receive no treatment
  - Inert pills and sham surgeries are typical placebos: Do not directly cause any physiological changes to the body, but patients treated with them tend to improve compared to patients who receive no treatment

200. Ans. (a) Is a randomized controlled clinical trial *[Ref. Park 23/e p81]*

In the given question, a pharmaceutical company develops a new anti-hypertensive drug; samples of 24 hypertensive patients, randomly selected from a large population of hypertensive people, are randomly divided into 2 groups of 12, and one group is given the new drug over a period of 1 month & the other group is given a placebo according to the same schedule,

Since a new drug (intervention) is given it is an experimental/ interventional study (not a prospective study which is only observational in design)

Also, there are 2 groups, i.e. experimental group (Intervention – new drug is given) and reference group (no intervention is given – only placebo is given) which are compared concurrently, thus it is a *'Concurrent parallel design of RCT'* (there is no cross-over)

Also, neither the patients nor the treating physicians are aware of which patients are in which group, thus it is a *'double blinded RCT'*

201. Ans. (c) Randomized control trials *[Ref. The Medical Journal Of Australia. 2003, (79); 438-40]*

202. Ans. (d) Equal and known chance *[Ref. The Concise Oxford English Dictionary, 10/e p1185]*

RANDOM: Implies *'Equal and known chance'*

Also Remember

- Randomisation in Random sampling is to ensure every unit of population has equal chance of being selected
  - Types of random (Probability/ Non-purposive sampling):
    1. Simple random sampling
    2. Systematic random sampling
    3. Stratified random sampling
    4. Multistage random sampling
    5. Multiphase random sampling
    6. Cluster random sampling

203. Ans. (d) Ensure that the study groups are comparable on base line characteristics *[Ref. Park 22/e p79 and Epidemiology by Leon Gordis, 4/e p116-17]*

204. Ans. (c) They use the patient as his or her own control *[Ref. Handbook of Drug Abuse Prevention by Slobada & Bukoski; p534-35]*

- *Pre-post clinical trial:*
  - *Does not have a true control group*: Patient as his or her own control
  - *Each patient has a pre-test score followed by a post-test*: Difference in scores reflect change attributed to intervention
  - *Use*: Is often used in assessing whether knowledge, attitudes or pre-existing risk behaviors change when a subject is assigned to an intervention
  - *Limitations*:
    1. Difficult to assess if change is due to developmental intercourse
    2. Difficult to assess if change is due to regression to mean

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3. Cannot be used for studies involving mortality as post-test won't be available
4. More difficult to interpret than the comparable parallel clinical trial
5. Cannot be randomized

205. Ans. (c) Randomization *[Ref. Park 23/e p82]*

206. Ans. (d) Ecological studies *[Ref. Park 21/e p59, Park 22/e p60]*

Also Remember

- *Ecological study (Correlational study)*:
  - Type of analytical (observational) epidemiological study which provide the '*least satisfactory type of evidence on causality*'
  - *Units of study:* Population
  - *Advantage:* Data can be used from populations with different characterstics
  - *Potential problem:* Socio-economic confounding
  - *Ecological fallacy:* Is an error of interpretation of statistical data in an ecological study, whereby characteristics are ascribed to a group of individuals which they may not possess as individuals

207. Ans. (a) The two groups will be similar in prognostic factors *[Ref. Park 23/e p82]*

208. Ans. (c) To eliminate the selection bias *[Ref. Park 23/e p82]*

209. Ans. (a) Can't double blind in animal trials; (b) All animal trials are unethical; (c) Can't do interin analysis. *[Ref. Internet] [Ref. Park 23/e p81]*

- Double blinding can be performed in animal trials
- Ethical issues in animal trials is under debate
- Interim analysis can be done in experimental trials
- Experimental trials are longitudinal and prospective.

210. Ans. (c) Clinical trial phase III *[Ref. Fundamental of Clinical Trials, 1/e p4]*

CLINICAL TRIALS

- *Phases of a Trial*:

Phase	Unit of study	Purpose
PRE-CLINICAL TRIALS/ LAB-EXPERIMENTS		
	Animals	Pretesting in animals
CLINICAL TRIALS		
Phase 0	Healthy Human volunteers	Microdosing
Phase I	Healthy human volunteers	Establishment of safety and non-toxicity
Phase II	Patients	Establishment of effectiveness
Phase III	Patients	Comparison with older/ existing drug(s)
Phase IV	Patients	Assessment of long term side effects

- *Phase III is a RCT*: Comparison of a new drug with an existing old drug
- *Longest phase of a trial*: Phase IV
- *New drug is launched in market after*: Phase III
- *Post-marketing surveillance*: Phase IV

211. Ans. (b) Systematic meta-analysis *[An introduction to clinical research, 1/e p182]*

EVIDENCE-PYRAMID IN RESEARCH: ***[From top to bottom]***

- Meta-analysis (Highest clinical relevance: GOLD STANDARD)
- Systematic review
- Cohort study
- Case control study
- Case series
- Case report
- Ideas, Editorials, Opinions
- Animal research
- In-vitro (test-tube) research (Lowest clinical relevance)

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212. Ans. (d) Dropouts are excluded from the study *[Ref. Park 23/e p81]*

213. Ans. (a) Phase 1 *[Ref. Prospectives on Cancer Care by Fawcett, 1/e p183]*
- Phase 1 Clinical trials is used to evaluate Maximum tolerated dose (MTD) of a new drug

214. Ans. (a) Randomization *[Ref. K. Park 23/e p82]*

215. Ans. (b) 2 *[Ref. Targeted Regulatory Writing Techniques by Foote, 1/e p14]*

216. Ans. (d) The validity does not depend on quality of systemic review *[Ref. Doing meta-analysis in research: A systematic approach by Dr Vivek Jain, IJDVL, 2012;78:242-50]*

META ANALYSIS
- *Description*: Uses a statistical approach to combine the results from multiple studies in an effort to increase power (over individual studies), improve estimates of the size of the effect and/or to resolve uncertainty when reports disagree
  - Meta-analysis is an objective, systematic review that employs statistical methods to combine and summarize the results of several studies
  - It is a quantitative synthesis of all the unbiased evidence, meant for summarizing large volume of data, establishing and determining the magnitude of an effect, and to increase power and precision of studies
- *Strengths of Meta-analysis*:
  - Provides a point estimate of an effect size: It tends to increase power
  - May help to 'Identify few gaps' in a particular field
- *Limitations of Meta-analysis*:
  - *'GIGO principle - Garbage-in, garbage-out procedure'*: Results can only be as good as the original data is valid, so quality of Systematic review is important
  - *'Apples and oranges effect'*: Tendency to average/mash together disparate effects which may have resulted from the heterogeneity of the studies
  - *'File drawer effect'*: Publication bias
  - Meta-analysis 'relies on shared subjectivity' rather than objectivity

217. Ans. (a) Meta-analysis always performed *[Ref. Evidence Based Dermatology by Williams, 2/e p38]*

SYSTEMATIC REVIEW
- *Description*: A document related after comprehensively reviewing and combining all the information from both published and unpublished studies (focusing on a particular clinical or health related topic/question) and then summarizing the findings
- *Steps of Systematic Review*:
  - Asking a clear, focused question
  - Explicit through search of literature
  - Data extraction
  - Critical appraisal of quality of primary studies
  - Quantitative pooling of data
  - Interpretation of data, including implications for clinical practice and further research

ALSO REMEMBER
- Meta-analysis can (and should) be embedded in a systematic review, but this is not always done
- A single systematic review can contain multiple meta-analyses

218. Ans. (d) Increases external validity of study *[Ref. Experimental Designs by Todmann, 2/e p9]*

RANDOMISATION IN RCT
- Reduction of selection
- Ensure comparability of both groups
- Ensure similar prognostic factors in both groups
- Facilitates blinding of treatment
- Increases Internal validity of study

Review Question

219. Ans. (c) Before and after comparison studies *[Ref. Park 21/e p79, Park 22/e p80]*

220. Ans. (a) Selection bias *[Ref. Park 23/e p82]*

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221. Ans. (b) Drop outs results are excluded from the study *[Ref. Park 23/e p81]*

222. Ans. (c) Both observer and person or group being observed is blind about the study *[Ref. Park 23/e p83]*

ASSOCIATION AND CAUSATION

223. Ans. (c) Specificity of association *[Ref. Park 23/e p89, 90]*

HILL'S (Surgeon General's) CRITERIA OF CAUSAL ASSOCIATION:

- *Temporal association*:
  - Implies *'cause precedes effect'* or *'effect follows cause'*
  - Considers both *'order of appearance' as well as ' length of interval between exposure and disease'*
  - Is *'most important criterion'* of causal association
  - Is *'best established by a cohort study'* (Especially Concurrent cohort study)
- *Strength of association*:
  - Relative risk (cohort study)
  - Odds ratio (case control study)
- *Specificity of association*:
  - Implies that disease under study is caused only by risk factor under study
  - Is *'most difficult criterion to establish'*
  - Is *'weakest criterion'* of causal association
- *Consistency of association*:
  - Implies that results are replicable in different settings and by different methods
- *Biological plausibility*:
  - Implies existence of biological credibility of association (anatomically, physiologically explainable/ justifiable)
- *Coherence of association*:
  - Implies that the causal association must be coherent (supported by) with relevant facts/related studies
- *Dose-response relationship*:
  - Implies that increase in dose of cause increases incidence/ prevalence of effect
- *Cessation of exposure; Reversibility*:
  - Implies that removal of possible cause reduces the risk of disease
- *Study design*:
  - Implies that if study design is based on a strong study design
  - Abilities of epidemiological study designs to prove causality:

Type of study	Ability to prove causation
Randomised controlled trial	Strong
Cohort study	Moderate
Case control study	Moderate
Cross sectional study	Weak
Ecological study	Ecological study

Also Remember

- *Judging the evidence for causal association*:
  - Temporality of association (Highest weight given)
  - Biological plausibility
  - Consistency of association and
  - Dose-response relationship
- Hill's criteria (sometimes also known as *'Surgeon General's Criteria'* of causal association) in epidemiology are ANALOGOUS TO Koch's Postulates (of causal association between a microbe and disease) in Microbiology

224. Ans. (c) Randomized control trials *[Ref. Epidemiology by Leon Gordis, 4/e p221 and Basic Epidemiology by Beaglehole, WHO; p80]*

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225. Ans. (d) Incorrect because as no control or comparison group was involved *[Ref. Epidemiology by Leon Gordis, 4/e p 117]*

- *An epidemiological study is characterized by presence of a control/ comparison group*: Without a comparison group it is difficult to ascribe the causality of risk factor/exposure to a disease
- **COMPARISON GROUPS IN EPIDEMIOLOGICAL STUDIES:**

Type of study	First group	Comparison group
Cohort study *Case control study* *Randomized controlled trial*	Exposed group (presence of risk factor/ exposure) Cases group (diseased persons) Experimental group (intervention given)	Non-exposed group (absence of risk factor/ exposure) Controls group (non-diseased persons) Reference group (no intervention given)

- *If no comparison group is chosen in epidemiological studies*:
  - *In a Cohort study*: Strength of association (Relative Risk) between risk factor (exposure) and disease cannot be determined
  - *In a case control study*: Strength of association (Odds Ratio) between disease and risk factor (exposure) cannot be determined
  - *In a Randomized controlled trial*: Actual outcome cannot be ascribed to the intervention

In the given question, an advertisement in a medical journal stated that 2000 subjects with sore throat were treated with their new medicine and with in 4 days, 94% were asymptomatic; the advertisement claims that the medicine was effective

Since, no comparison group (Reference group – Patients without new medicine treatment or placebo-treated) was used in the study, there is a possibility that the effect (asymptomatic) could be spontaneous (for e.g. reduction of fever) or due to some other factor (for e.g. environmental)

Thus the above claim is false/incorrect

226. Ans. (b) Ecological study *[Ref. Epidemiology by Leon Gordis, 4/e p204 and Basic Epidemiology by Beaglehole, WHO; p80]*

227. Ans. (c) Cohort study *[Ref. Basic Epidemiology by Beaglehole, WHO; p41]*

- *Most preferable observational/ analytical study design: Cohort study*
- *Least preferable observational/ analytical study design: Ecological study*

Refer to answer 197, 90

- Useful Parameter(s) obtained by epidemiological studies:

Epidemiological studies	Useful parameter(s) obtained
Cohort study	Incidence, Relative risk, Attributable risk, Population attributable risk
Case control study	Odds ratio
Cross sectional study	Prevalence
Ecological study	Group characteristics

Also Remember

- *Applications of various study designs*:

Application	Utility of study			
	Cohort	Case-control	Cross-sectional	Ecological
Investigation of rare disease	–	+++++	–	++++
Investigation of rare cause	+++++	–	–	++
Testing multiple effects	+++++	–	++	+
Study of multiple exposure	+++	++++	++	++
Measurement of time relationship	+++++	+	–	++
Direct incidence measurement	+++++	+	–	–
Investigation of long latent periods	+	+++	–	–

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228. Ans. (b) Temporal relationship *[Ref. Park 23/e p89-90]*

229. Ans. (b) Temporality *[Ref. K. Park 23/e p86]*

230. Ans. (a) RCT *[Ref. Contemporary Drug Information by Gleason, 1/e p65]*

Review Questions

231. Ans. (d) Reversibility or reversible association *[Ref. Park 23/e p89, 90]*

232. Ans. (d) Indirect association *[Ref. Park 23/e p89]*

EPIDEMIOLOGY OF INFECTIOUS DISEASES

233. Ans. (b) Anthropozoonoses *[Ref. Park 23/e p93, 94]*

- *ZOONOSES*
  - *Anthropozoonoses*: Infections transmitted from animals (zoo) to man (anthro):
    1. Rabies
    2. Plague
    3. Anthrax
    4. Hydatid disease
    5. Trichinosis
  - *Zooanthroponoses*: Infections transmitted from man (anthro) to animals (zoo):
    1. Human TB in cattle
  - *Amphixenosis*: Infections transmitted in either direction between animals and man:
    1. Trypanosoma cruzi
    2. Schistosoma japonicum

234. Ans. (b) Is constantly present in a given population group *[Ref. Park 23/e p93]*

- *Endemic*: refers to the *'usual or expected frequency of disease'* within a population group; is the *'constant presence of a disease in a defined geographical area'*
  - *Hyperendemic*: When a disease is constantly present at a high incidence and/or prevalence rate and affects all age groups equally.
  - *Holoendemic*: When a disease has a high level of infection beginning early in life and affects most of children population. So, disease is more common among children than adults
- *Endemic curve*: Is drawn between no. of cases due to a disease and the time
  - *Endemic curve IS NOT a straight line*: as number of cases for the endemic disease in a population will not be fixed throughout a year; it will show a seasonal or other variation
  - *Endemic curve Vs epidemic curve*: In endemic curve, the baseline of the curve NEVER touches zero
- When a disease occurs *'clearly in excess of normal expectancy'*, it becomes an *Epidemic*
- *Ecdemic:* of or relating to a disease that originates outside the geographical area in which it occurs

235. Ans. (c) Sporadic *[Ref. Park 23/e p93]*

236. Ans. (c) Pandemic *[Ref. Park 23/e p93]*

237. Ans. (d) To estimate the fatality of the disease *[Ref. Park 23/e p40]*

238. Ans. (b) infectivity *[Ref. Internet] [Ref. Park 22/e p89]*

- *Infectivity*: Number infected/Number exposed
- *Pathogenicity*: Number of diseased/Number infected
- *Virulence*: Number of serious condition & mortality/Number diseased
- *Case fatality*: Number of deaths/Number of cases
- *Communicability*: Ability of a disease to spread from infective to susceptible hosts

239. Ans. (b) Influenza A *[Ref. Park 23/e p93]*

- Hepatitis B is endemic throughout the world
- Influenza B and C doesnot cause Pandemics

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240. Ans. (b) Rabies *[Ref. K. Park 23/e p278-279]*

241. Ans. (a) Measles; (b) Mumps; (d) Hepatitis B; (e) Poliomyelitis *[Ref. K. Park 23/e p96]*

Review Questions

242. Ans. (d) Instruments *[Ref. Park 23/e p359]*

243. Ans. (a) Rabies *[Ref. Park 23/e p276-281]*

244. Ans. (b) Nosocomial infections *[Ref. Park 23/e p359]*

245. Ans. (c) Exotic disease *[Ref. Park 21/e p89, Park 22/e p90]*

DISEASE TRANSMISSION

246. Ans. (a) Brucellosis *[Ref. Park 23/e p94-97]*

- *Source*: Is a person, animal, object or substance from which an infectious agent passes or is disseminated to the host.
  - Source refers to immediate source of infection & may or may not be part of reservoir
- *Reservoir*: Is any person, animal, arthropod, plant, soil or substance (or combination of these) in which an infectious agent lives & multiplies, on which it primarily depends for survival, & where it reproduces itself in such a manner that it can be transmitted to a susceptible host.

Infection	Source	Reservoir
Hookworm	Soil	Man
Tetanus	Soil	Soil
Typhoid	Feces/urine/Food/Milk/Water	Case/ Carrier

- *Human Reservoir*:
  - *Cases*: Persons having particular disease, health disorder or condition under investigation
  - *Carriers*: Infected person or animal that harbours a specific agent in the absence of discernible clinical disease, & serves as a potential source of infection for others. *Carriers are less infectious than cases but are more dangerous epidemiologically.*
- *Animal reservoir*, e.g. Rabies, Influenza, Yellow Fever, Histoplasmosis
- *Reservoir in non-living things*, e.g. Soil harbour agents for Tetanus, Anthrax, Cocciomycosis, Mycetoma

Also Remember

- *Reservoir(s) of important diseases*:

Disease	Microorganism	Reservoir(s)
Epidemic Typhus	Rickettsia prowazekii	Humans
Endemic Typhus	Rickettsia typhi	Rats
Scrub Typhus	Rickettsia tsutsugamushi	Trombiculid Mite
Indian Tick Typhus	Rickettsia conori	Rodents
RMSF	Rickettsia rickettsii	Rodents
Rickettsial Pox	Rickettsia akari	Mice
Trench fever	Bartonella quintana	Humans
Q fever	Coxiella burnetti	Cattle, sheep, goat
Dracunculiasis	Dracunculus medinensis	Humans
Ascariasis	Ascaris lumbricoides	Humans
Ancylostomiasis	Ancylostoma duodenale	Humans

247. Ans. (b) Median incubation period *[Ref. Park 23/e p99]*

- *Incubation period*: is the time interval between invasion by an infectious agent and appearance of the first sign or symptom of the disease in question
- *Median incubation period*: Is the time required for 50% of cases to occur following exposure
- *Generation time*: is the time taken for a person from receipt of infection to develop maximum infectivity
  - Is roughly equal to the incubation period of the disease

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- *Secondary Attack Rate (SAR)*: Is no. of exposed persons developing the disease within range of incubation period (IP), following exposure to the primary case

$$SAR = \frac{\text{No. of exposed persons developing disease within range of IP}}{\text{Total no. of exposed '}susceptible\text{' contacts}} \times 100$$

  - Denominator includes *only those susceptible* to disease
  - *Primary case is always excluded both from numerator and denominator* for SAR calculation

Also Remember

- *Incubation period depends upon*:
  - Generation time of the pathogen
  - Portal of entry
  - Infective dose
  - Individual susceptibility
- *Incubation period of a disease is useful for*:
  - Tracing the source of infection and contacts
  - Determining the period of surveillance
  - Applying immunization principles for prevention of diseases
  - Identification of point source or propagated epidemics
  - Estimating prognosis of a disease
- *Latent period*: Is the period from disease initiation to disease detection, used in non-infectious diseases as equivalent of incubation period
- *Serial interval*: is the gap in onset between primary case (first case in the community) and secondary case (case developing through infection from the primary case)
  - By collecting information on series of secondary cases with serial intervals, one can guess the incubation period of a disease
- *Period of communicability*: is the time during which an infectious agent may be transferred directly/indirectly from an infected person to another person, from infected animal to man or from an infected person to animal, including arthropods
  - An important measure of communicability is secondary attack rate
- *Secondary Attack Rate (SAR) of few diseases*:

Disease	Secondary Attack Rate (SAR)
Smallpox	30 – 45%
Measles	> 80%
Chickenpox	~ 90%
Mumps	~ 86%
Pertussis	~ 90%

248. Ans. (d) 100% *[Ref. Park 23/e p100]*

In the given question,

- There is a 6-membered family, comprising of two parents and four children
- On 12 August 2006, one of the children got measles, so she/he is the primary case
  by 18 August 2006, 2 other siblings also got measles, so they are the secondary cases
- Parents are *not susceptible* (in a country like India), one of the children (3 yr old) is completely immunized for his age thus she/he is *not-susceptible*, and primary case is *not included* in numerator or denominator
  Therefore, total no. of susceptibles in the family: 6 – 2 – 1 – 1 = 2
  So, SAR = 2/2× 100 = 100%

Interpretation: *All of those susceptible develop the disease* from primary case within range of incubation period

249. Ans. (d) 65% *[Ref. Park 23/e p100]*

- **In the given question**, a village has 100 under five children and the coverage of measles vaccine is 60%; following a measles case 26 children developed measles,
- Since coverage of Measles vaccine is 60%, 60% 0f 100 children i.e. 60 children are vaccinated (not susceptible to Measles)
- So only 40 children are susceptible to Measles
- Out of 40 children, 1 child develops Measles (primary case) and then out of rest 39 susceptible (primary case excluded from denominator), 26 develop Measles
- Therefore, SAR = 26/39 × 100 = 66%

Interpretation: *Two-thirds of those susceptible develop the disease* from primary case within range of incubation period.

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Also Remember

- *Cases in epidemiology*:
  - Primary case: First case of communicable disease introduced into the population unit being studied
  - Index case: First case that comes to the notice of the investigator (first case reported to the health system)
  - Secondary cases: Cases that develop from contact with the primary case
- *Attack rate (AR)*:
  - Relates to no. of cases in the population at risk
  - Reflects extent of epidemic
  - Is used when 'population is exposed to risk for a limited period of time, such as epidemic'

$$AR = \frac{\text{No. of new cases of specified disease in a specified time interval}}{\text{Total population at risk during the same time interval}} \times 100$$

250. Ans. (b) The interval of time between the receipt of infection by host and maximal infectivity of the host

[Ref. Park 23/e p100]

	Generation time	Incubation period (IP)
Definition	Is the time taken for a person from receipt of infection to develop maximum infectivity	Is time interval between invasion by an infectious agent & appearance of first sign or symptom of disease in question
Remark	Is roughly equal to the IP of the disease	Median IP: Is the time required for 50% of cases to occur following exposure
Applicability	Transmissions of infections whether clinical	Infections that result in manifest disease or subclinical

251. Ans. (b) Period of communicability *[Ref. Park 23/e p100]*

Also Remember

- *Generally communicable disease are not communicable in incubation period EXCEPT*:
  - Measles
  - Chickenpox
  - Whooping cough (Pertussis)
  - Hepatitis A

252. Ans. (a) 60% *[Ref. Park 23/e p100]*

In the given question, A family consists of 2 parents & 6 children susceptible to measles. There occurs a primary case of measles and 3 secondary cases within a short period of time. Thus, ***numerator is 3*** (*Primary case is excluded from numerator*). Now denominator includes those susceptible to disease (and in close contact)

Both parents cannot be considered susceptible (*In a country like India, measles infection is quite common in 6 months – 3 years age, virtually affecting everyone. ALSO, like infection, vaccine too provides lifelong immunity*)

There are 6 children, but since one is a primary case, he shall be excluded from the denominator.

Thus 6 *MINUS* 1 = 5 are only susceptible

Therefore, ***Denominator is 5***

So, **SAR** = 3/ 5 ×100 = **60%**

Interpretation: *Two-fifths of those susceptible develop the disease* from primary case within range of incubation period

253. Ans. (c) All susceptibles amongst close contact *[Ref. Park 23/e p100]*

- *Secondary Attack Rate (SAR)*: Is no. of exposed persons developing the disease within range of incubation period, following exposure to the primary case
- Denominator includes *only those susceptible* to disease
- *Primary case is always excluded both from numerator and denominator* for SAR calculation
- **For Example:** In a pre-nursery class of 100 students, 33 students are already immunized for measles and 33 others had suffered from measles previously. Then a student 'Rohit' develops measles one day and 22 other students develop measles subsequently in the next week. What is the SAR?

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Solution: 22 other students develop measles within incubation period (IP of Measles: 10-14 days) from primary case 'Rohit'. Thus, ***numerator is 22*** (*Primary case 'Rohit' is excluded from numerator*).

Now denominator includes those susceptible to disease (and in close contact)

33 students are immunized already, therefore they are not susceptible (*Immunization confers life long immunity to infections like measles*)

33 students have suffered from measles previously, therefore they are not susceptible (*Natural infection confers life long immunity to infections like measles and chickenpox*)

Thus 100 *MINUS* (33 + 33) = 34 are only susceptible

Therefore, ***Denominator is 33*** (34 *MINUS* 1; as *Primary case 'Rohit' is excluded from denominator also*)

So, **SAR** = 22/ 33 ×100 = **66%**

Interpretation: *Two-thirds of those susceptible develop the disease* from primary case within range of incubation period.

Also Remember

- In measles disease, both natural infection and vaccination confers life long immunity/protection from infection of measles.

254. Ans. (a) Time gap between primary and secondary case *[Ref. Park 23/e p100]*

255. Ans. (a) AIDS *[Ref. Park 23/e p343-355]*

256. Ans. (c) Cyclo-developmental transmission *[Ref. Park 23/e p98]*

257. Ans. (d) Typhoid *[Ref. Park 21/e p91, Park 22/e p92]*

258. Ans. (b) "Reservoir" and "Source" of infection are synonymous *[Ref. Park 23/e p94-5]*

259. Ans. (d) Infectious disease are not communicable during IP *[Ref. Park 23/e p99]*

260. Ans. (a) Polio; (c) Salmonella typhi *[Ref. Park 23/e p94-95]*

261. Ans. (a) Pertussis; (c) Measles *[Ref. Park 23/e p99]*

262. Ans. (c) Mumps; (d) Measles; (e) Influenza *[Ref. Park 23/e p95-96]*

263. Ans. ALL CHOICES *[Ref. Park 23/e p120]*

- *Isolation*: Separation for the period of communicability of persons/ animals from others to prevent disease transmission

Disease	Duration of isolation
Chicken pox	6 days after onset of rash
Measles	Onset of catarrhal to 3rd day of rash
German Measles	NONE (except Ist trimester of pregnancy)
Cholera, Diphtheria	3 days after tetracyclines started till 48 hours of antibiotics
Shigellosis, Salmonellosis	Until 3 consecutive negative stool cultures
Hepatitis A	3 weeks
Influenza	3 days after onset
Polio	2 weeks adult, 6 weeks paediatric
Tuberculosis	Until 3 weeks of effective chemotherapy
Herpes zoster	6 days after onset of rash
Mumps	Until swelling subsides
Pertussis	4 weeks or until paroxysms cease
Meningococcal meningitis,	Until first 6 hours antibiotics completed
Streptococcal pahryngitis	Until first 6 hours antibiotics completed

264. Ans. (a) Polio; (b) Diphtheria; (c) Leprosy; (d) Pneumonic plague *[Ref. Park 23/e p120]*

265. Ans. (a) Polio; (b) Cholera; (c) Pertussis *[Ref. Park 23/e p95-96]*

266. Ans. (a) Cholera; (b) Influenza; (c) Plague *[Ref. Park 23/e p99]*

267. Ans. (b) Diphtheria; (c) Cholera; (d) Typhoid *[Ref. Park 23/e p95-96]*

268. Ans. (c) Contamination *[Ref. Park 23/e p92-93]*

- *Infection*: Entry of organism and its multiplication and/or development in host
- *Infestation*: Lodgement, development and reproduction of arthropods on surface of body or clothes

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- *Contamination*: Presence of infectious organism on body or in clothings/beds/ toys/surgical instruments/dressings/ in-animate objects
- *Contagion*: Transmission of disease from one person to another by direct or indirect contact

269. Ans. (b) Maximum incubation period *[Ref. K. Park 22/e p95, 113]*

270. Ans. (c) Index case *[Ref. K. Park 23/e p100]*

271. Ans. (b) To find out time for isolation *[Ref. K. Park 23/e p100]*

272. Ans. (c) Malaria *[Ref. K. Park 23/e p99-100]*

273. Ans. (d) Rubella – Until 7 days after appearance of rash *[Ref. K. Park 23/e p120]*

274. Ans. (c) Exposure to laboratory detection of disease *[Ref. Practical transfusion Medicine by Murphy, 3/e]*

Review Questions

275. Ans. (d) Rabies, tetanus *[Ref. Park 21/e p277, 310]*

276. Ans. (d) Chronic carrier *[Ref. Park 23/e p95]*

277. Ans. (a) Herpes simplex *[Ref. Park 23/e p95]*

278. Ans. (a) Latent infection *[Ref. Park 23/e p95]*

279. Ans. (a) Diphtheria *[Ref. Park 23/e p120]*

280. Ans. (b) Tetanus *[Ref. Park 23/e p102]*

281. Ans. (a) Source and Reservoir *[Ref. Park 23/e p94-95]*

282. Ans. (d) Secondary attack rate *[Ref. Park 23/e p100]*

283. Ans. (a) Developmental *[Ref. Park 23/e p98]*

284. Ans. (c) Malaria *[Ref. Park 23/e p277, 310]*

285. Ans. (b) Paradoxical carrier *[Ref. Park 23/e p95]*

286. Ans. (b) Measles *[Ref. Park 23/e p146-147]*

287. Ans. (a) Typhoid *[Ref. Park 23/e p98]*

288. Ans. (a) Transplacental *[Ref. Park 23/e p95]*

289. Ans. (a) Cyclopropagative *[Ref. Park 23/e p98]*

290. Ans. (a) The time required for 50% of the case to occur following exposure *[Ref. Park 23/e p99]*

291. Ans. (c) Both *[Ref. Park 23/e p255, 303]*

292. Ans. (a) Incubation period *[Ref. Park 23/e p99]*

INVESTIGATION OF AN EPIDEMIC

293. Ans. (c) No new case reported for twice the incubation period of disease since the last case *[Ref. Park 22/e p123]*

- Searching for more cases: Search for new cases is carried out everyday, till the area is declared free of epidemic; this period is usually taken as *'twice the incubation period of the disease since the occurrence of last case'*

294. Ans. (c) Verification of diagnosis *[Ref. Park 23/e p131]*

- *Verification of diagnosis*:
  1. Is the *'first step in investigation of an epidemic'*
  2. It is *'not necessary to examine all cases'*: take sample
  3. Do not wait for laboratory results for epidemiological investigations

IMMUNITY, VACCINES AND COLD CHAIN

295. Ans. (a) Two live vaccines cannot be administered simultaneously *[Ref. Park 23/e p103]*

LIVE VACCINES:

- Are prepared from live attenuated organisms

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- *Live vaccines are more potent agents than killed vaccines*:
  - Multiply in the host and the resulting antigenic host is larger than what is injected
  - Have all the major and minor antigenic components
  - Engage certain tissues of the body (e.g. intestinal mucosa by OPV)
  - There may be other mechanisms such as persistence of latent virus
- Immunization is generally achieved with a single dose (EXCEPT OPV)
- Should not be administered to immuno-deficient or immuno-suppressed persons
- 2 live vaccines can be administered simultaneously at different sites (or at an interval of 3 weeks)

Also Remember

- *Attenuation*: Reduced pathogenicity/virulence BUT maintained antigenicity/immunogenicity
- *General rules for multiple vaccine administration*:
  - 2 live vaccines can be given together
  - Live and killed vaccines can be given together
  - Cholera vaccine and Yellow fever vaccine cannot be given together
  - OPV is a live vaccine where single dose is not sufficient for immunization

296. Ans. (c) 'Danish' 1331 *[Ref. Park 23/e p196]*

297. Ans. (a) Egg culture (c) Reconstituted vaccine should be used within one hour *[Ref. Park 21/e p138, 139, Park 22/e p140, 141]*

- **MEASLES VACCINE:**
  - *Type*: Live attenuated, lyophilized (Freeze dried) vaccine (Tissue culture vaccines – Chick embryo or Human diploid cell line)
  - *Strains used*:
    1. Edmonston Zagreb Strain (Most Common)
    2. Schwartz Strain
    3. Moraten Strain

Also Remember

- *Measles immunoglobulin*
  - Type: Human Normal Immunoglobulin
  - Dose (WHO recommended): 0.25 ml/kg body weight

298. Ans. (b) Polio *[Ref. Combination Vaccines by Ronald W. Ellis; p43]*

- *Thermolability of vaccines*: sensitivity to heat
  Reconstituted BCG > YF > OPV > Measles & Reconstituted Measles > Hep B > DPT > DT > BCG > TT
  - *Most Thermolabile vaccine*: Reconstituted BCG
  - *Most Thermostable vaccine*: TT

299. Ans. (b) BCG, DPT-1, OPV-1, Measles, Vitamin-A *[Ref. IAP Guidebook on Immunization]*

- *Age limits for delayed immunization in NIS, India:*

Vaccine	Age limit	Reason for limit (if any)
BCG	Upto 1 year of age (Direct BCG)	Subclinical immunity develops after 1 yr age
OPV	Upto 5 years of age	Polio cases are MC in < 5 yrs age
HepB	Upto 1 year of age	–
Measles	Upto 5 year of age	Measles cases MC in < 5 yrs age
Vitamin A	Upto 5 year of age*	Xerophthalmia cases MC in < 5 yrs age
DPT	Upto 7 year of age	Diphtheria cases MC in < 7 yrs age
JE	Up to 15 years of age	–
TT	NO AGE LIMIT	–

(* Vitamin A was earlier given till the age of 3 years)

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Also Remember

- In India, NIS starts at birth; and ends at 16 years (males) and with last pregnancy (females)
- 'Indirect BCG' is given after 1 year age: After a prior Mantoux test
- Any number of vaccines (live and/or killed) can be given together
- There need not be a gap of 1 month between a live and a killed vaccine
- BCG and Measles vaccine can be given together for a case of delayed immunization
- Minor fever, diarrhea, ARI or other illness is NOT a contraindication for any of the vaccines
- Doses and schedule remain same even if baby is premature and/or underweight
- *In Delhi's Immunization Schedule, there are 2 additional vaccines:*
  - MMR (single dose at 15 months of age)
  - Typhoid (single dose between 2-5 years of age)
- *Guidelines on TT in pregnancy:*
  - Primigravida: 2 doses 1 month apart, as early as possible in pregnancy
  - DURATION OF PROTECTION WITH 2 DOSES: ALL SUBSEQUENT PREGNANCIES IN NEXT 3 YEARS
  - Multigravida (completely immunized in last 3 years): 1 booster dose is sufficient
  - Multigravida (partially immunized in previous pregnancy in last 3 years): 2 doses, 1 month apart
  - Multigravida (unimmunized in previous pregnancy in last 3 years): 2 doses, 1 month apart
  - Multigravida (completely immunized in previous pregnancy earlier than 3 years): 2 doses, 1 month apart
  - RULE FOR Delayed immunization of TT in pregnancy (as per Period of gestation – POG): Give 2 doses of TT, 1 month apart, anytime in pregnancy, IRRESPECTIVE OF TIME OF DELIVERY (so as to provide protection for atleast next 3 years).

300. Ans. (d) WHO recommends Danish 1331 strain for vaccine production *[Ref. Park 21/e p176, Park 22/e p178]*

- BCG stands for '*Bacille Calmette Guerin*' – an '*avirulent strain*' produced by 239 subcultures over a period of 13 years
- *WHO recommended strain*: DANISH 1331 strain
  - *Vaccine strain is derived from 'Mycobacterium bovis'*
  - Prepared at BCG laboratory, Guindy, Chennai in India

Also Remember

- *BCG is contraindicated in (Being a live vaccine)*
  - Pregnancy
  - Immunosuppressive states
  - During corticosteroid therapy
- *WHO recommended policy on BCG vaccination in HIV*:
  - Asymptomatic HIV positive infants in high endemic areas: BCG can be given
  - Asymptomatic HIV positive infants in low endemic areas: BCG need not be given

301. Ans. (d) *[Ref. IAP Guidebook on Immunization]*

- *Vaccines to be given in situations of delayed immunizations in India*:
  - 9 month old unimmunized child comes for immunization first time:
    1. BCG (Direct)
    2. OPV_1 (3 successive doses 1 month apart, booster after 1 year of 3rd dose)
    3. DPT_1 (3 successive doses 1 month apart, booster after 1 year of 3rd dose)
    4. $HepB_1$ (3 successive doses 1 month apart)
    5. Measles
    6. Vitamin A (1 Lac IU)
    7. HiB_1 (2 successive doses 1 month apart)
  - 1½ yr old unimmunized child comes for immunization first time:
    1. BCG (Indirect)
    2. OPV_1 (3 successive doses 1 month apart, booster after 1 year of 3rd dose)
    3. DPT_1 (3 successive doses 1 month apart, booster after 1 year of 3rd dose)
    4. Measles
    5. Vitamin A (2 Lac IU)
    6. Hib (1 dose)
    7. JE

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- 3½ yr old unimmunized child comes for immunization first time:
  1. BCG (Indirect)
  2. OPV_1 (3 successive doses 1 month apart, booster after 1 year of 3rd dose)
  3. DPT_1 (3 successive doses 1 month apart, booster after 1 year of 3rd dose)
  4. Measles
  5. Vitamin A (2 Lac IU)
  6. HiB (1 dose)
  7. JE

302. Ans. (d) Yellow fever *[Ref. Park 23/e p103]*

Also Remember

- *Polyvalent vaccines*: Vaccines prepared from two or more strains of same species
- *Autogenous vaccines*: Organism in the vaccine is obtained from the same patient
- Hepatitis B is a *'Subunit vaccine'*
- H. influenza B (HiB) vaccine is a *'Conjugate vaccine'*
- *Specific contraindications of vaccines*:
  - Vaccines contraindicated in Pregnancy: All live vaccines EXCEPT Yellow fever vaccine
  - *Vaccines contraindicated in HIV*:
    1. Asymptomatic HIV: NONE
    2. Symptomatic HIV: All live vaccines EXCEPT BCG vaccine
  - *Vaccines contraindicated in Immuno-suppression*: All live vaccines
  - *Vaccines contraindicated in Corticosteroid therapy*: All live vaccines
  - *Vaccines contraindicated in fever*: Typhoid vaccines
    1. Typhoral
    2. Typhim – Vi
    3. *Vaccines contraindicated in ARTI/ diarrhoea*: NONE
  - *Vaccines contraindicated together*: Yellow fever and Cholera vaccine
  - *Vaccine contraindicated in Preterm-premature baby with birth weight < 2 kg*: Hepatitis B
  - *Vaccines contraindicated in age < 1 year (infants)*:
    1. Yellow fever vaccine
    2. Meningococcal vaccine
    3. Pneumococcal vaccine
  - *Vaccines contraindicated in age < 2 year (infants)*:
    1. Meningococcal vaccine
    2. Pneumococcal vaccine
    3. Typhoid vaccines
  - *Vaccine contraindicated in age > 2 year (infants)*: Pertussis vaccine (may lead to neurological complications – 1 per 1,70,000 vaccines)
  - *Vaccine contraindicated in progressive neurological disease*: Pertussis vaccine (Pertussis vaccine IS NOT CONTRAINDICATED IN epilepsy controlled on medications, Cerebral palsy)
  - *Only absolute contraindication to killed vaccines*: Severe local or general reaction to a previous dose
- *Specific side-effects of vaccines*:
  - *Guillian Barre Syndrome*: Killed influenza vaccine
  - *Vaccine associated paralysis*: OPV (Sabin)
  - *Toxic shock syndrome (TSS)*: Measles vaccine, MMR
  - *Shock*: DPT, Pertussis vaccine
  - *Hypersensitivity*: Hep-B, Meningococcal vaccine, DPT, dT
- *General rules for multiple vaccine administration*:
  - 2 live vaccines can be given together
  - Live and killed vaccines can be given together
  - Cholera vaccine and Yellow fever vaccine cannot be given together
  - OPV is a live vaccine where single dose is not sufficient for immunization

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303. Ans. (d) Change in colour of monitor

[Ref. National Health Programs of India by Dr. J. Kishore 8/e p156, Park 23/e p110, 207]

Refer to Figure vaccine vial monitor p113

- *WHO grading of VVM in OPV*: (Marker of pofency
  - *Is based on colour changes in VVM*: ONLY INNER SQUARE CHANGES COLOUR, circle always remain blue

WHO Grade	Outer Circle	Inner Square	Inference
Grade I	Blue	White	OPV can be used
Grade II	Blue	Light blue	OPV can be used
Grade III	Blue	Blue	OPV CANNOT be used
Grade IV	Blue	Purple/ Black	OPV CANNOT be used

Also Remember

- VVM has been introduced for almost all vaccines (in NIS) too in India
- In VVM, *'direct relationship exists between the rate of colour change and temperature'*
  - The lower the temperature, the slower the colour change
  - The higher the temperature, the faster the colour change
- *Rules for VVM use in India*:
  - Rule 1: If the inner square is lighter than the outer circle, the vaccine may be used
  - Rule 2: If the inner square is the same colour as, or darker than, the outer circle, the vaccine must not be used
- *The VVM inner square start point colour*: Is approximately 10% of the outer circle colour
- *Validation of VVMs*: Optical densitometer (for colour density measurement)
- *VVM is best interpreted on a nominal scale*: Usable or non-usable

304. Ans. (c) Presence of acellular pertussis component increases its immunogenicity *[Ref. IAP Guidebook on Immunization; p15]*

305. Ans. (c) 25 *[Ref. Park 23/e p162]*

- **DPT VACCINE:**
  - *Composition of DPT Vaccine*:

	Amount per dose (0.5 ml)	
Contents	**Glaxo**	**Kasauli**
Diphtheria Toxoid	25 Lf	30 Lf
Tetanus Toxoid	5 Lf	10 Lf
Pertussis killed acellular bacilli	20,000 million	32,000 million
Aluminium phosphate	2.5 mg	3.0 mg
Thiomersal	0.01 %	0.01%

306. Ans. (c) Killed vaccine *[Ref. Park 23/e p207]*

- *Vaccines for Poliomyelitis*:

	OPV (Sabin)	IPV (Salk)
Type of vaccine	Live attenuated virus	Killed formolised virus
Mode of administration	Oral	Subcutaneous or i.m.
Type of immunity	Humoral + Intestinal (local)	Humoral
Prevention of	Paralysis + intestinal re-infection	Paralysis
Control of epidemics	Effective	Not useful
Manufacture	Easy	Difficult
Cost	Cheaper	Expensive
Storage & transport	Require sub-zero temperatures	Less stringent conditions
Shelf life	Short	Longer
VAPP	1 per 1 million vaccinees	Zero incidence

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307. Ans. (c) Dial thermometer *[Ref. Park 21/e p102, Park 22/e p106]*

- *Dial Thermometer*:
  - Is the instrument used to monitor the temperature of cold chain at PHC
  - Is kept in ILR (Ice-lined refrigerator- component of cold chain) at PHC
  - Is *'based on principle of thermocouple'*
  - *Recommended temperature monitoring at PHC level is*: Twice daily

308. Ans. (d) Subcentre & village level *[Ref. Park 23/e p109]*

- *Cold chain components (equipments) and levels in India*:

Level	Component	Temperature	Storage duration
State/ Regional level	*Walk-in-cold rooms (WIC)*	+2° C to +8° C	3 months
	Walk-in-freezers (WIF)	–20° C to –40° C	
District level	*Large ILRs (Ice-lined refrigerator)*	+2° C to +8° C	1 month
	Large DFs (Deep freezers)	–20° C to –40° C	
PHC level	*Small ILRs*	+2° C to +8° C	1 month
	Small DFs	–20° C to –40° C	
Sub-centre level	*Vaccine carriers*	+2° C to +8° C	48 – 72 hours
	Day carriers		
Session level	*Fully frozen icepack*	+2° C to +8° C	1 – 3 hours

- *Most important component of cold chain in India*: ILR
- *Minimum level of vaccine storage (in cold chain) in India*: Primary health centre (below PHC level, vaccines are *'transported to sub-centres on immunization days'* in vaccine carriers and day carriers)
- *Maximum chance of cold chain failure in India*: Sub-centre and village level
- *Instrument used to monitor the temperature of cold chain at PHC*: Dial Thermometer

Also Remember

- *Ice-lined refrigerator (ILR)*:
  - Is 'most important component of cold chain' in India
  - Temperature of ILR (Cold chain) in India: +2° C to +8° C
  - Temperature monitoring of ILR: Dial thermometer (Twice daily)
  - ILR is used for storage of: All vaccines (Yellow fever vaccine is not apart of National immunization schedule of India, hence not stored in ILR)
  - 300/240 litres ILRs are supplied to districts and 140 litres ILR is supplied to PHCs
  - ILRs must be kept on a horizontal leveled surface, atleast 10 cms away from walls
  - ILRs can maintain temperature of vaccines if provided 'with even 8 hours of uninterrupted electricity per day'
- *Ice-pack*:
  - Is prepared by keeping in a Deep freezer
  - Is used for:
    1. Temperature maintenance during vaccine transportation, in a vaccine carrier
    2. Temperature maintenance during an immunization session
  - Is of total 320-340 ml capacity
  - Has a 'horizontal mark' – Water fill level (as water expands on freezing)
  - NOTHING should be added to water for freezing in an ice-pack
  - Has generally 2 holes – MEANT FOR keeping vaccines
- OPV is only vaccine in National immunization schedule (NIS) of India which requires a sub-zero temperature (–20° C to –40° C) for long term storage and transportation, thus it is also known as *'Urban vaccine'*
- *Reverse Cold Chain*: Is the term used for transportation of stools samples from a suspected polio case for diagnosis (National Polio Elimination Programme)
  - *Temperature of Reverse Cold Chain*: +2° C to +8° C
  - Specific 'red vaccine carrier' is used in reverse cold chain
  - *Warm chain*: Keeping a preterm, pre-mature newborn against the body to mother to prevent neonatal hypothermia (NNH)– *'Kangaroo Mother Care'*

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309. Ans. (c) Give 3rd doese and continue the course *[Ref. Park 23/e p162]*

- *Interval between doses of DPT*:
  - *Current recommendation*: Allow an interval of 4 weeks between 3 doses, followed by a booster at age of 1½ – 2 years, followed by another booster at 5 – 6 years
  - *2 month intervals DO NOT offer any advantage over 1 – month intervals* for protection against Diphtheria and Tetanus, and may not enhance Pertussis protection
  - *Shorter intervals confer protection at an earlier age which may be particularly important in Pertussis control*

In the given question, a 11-month old child has received two doses of DPT and polio, comes for further immunization after 5 months of the last dose, there is NO NEED to repeat the whole course. Continue form this point onwards, and complete the course.

310. Ans. (d) BCG, DPT-1, OPV-1, Measles *[Ref. Park 23/e p123]*

Also Remember

Important Practical Considerations:

- *Vitamin-A* is given at 9th, 18th, 24th, 30th, 36th, 42nd, 48th, 54th and 60th months (A total of 1 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac + 2 Lac = 17 Lac IU is given to a completely immunized child by 5 years of age)
- *OPV*: Minimum 5 doses are required for development of immunity
- *DPT*: Minimum 3 doses are given a month apart with booster after 1 year of the 3rd dose
- *TT*: A fully immunized adult (excluding pregnancy in females) would have received 7 doses of TT

311. Ans. (a) It should be stored in deep freezer; (c) Store stocks..... *[Ref. Park 23/e p109]*

- All vaccines are stored at temperature of *+2° to +80°* **including OPV** (*OPV vaccine is stored at -20° to -40°C, i.e., Subzero/freezing temperatures only for long term storage*) **but YF vaccine** *(YF vaccine is stored at -30° to +5°C)*
- Vitamin-A and Diluents (Normal Saline for BCG and Distilled/Sterile Water for Measles) need not be stored in cold chain; but they should be brought to temperature of cold chain before reconstitution
- All vaccines opened (partially or totally used) are discarded.

Also Remember

- All unopened/ unused vaccines from an immunization session (if maintained in cold chain) can be brought back to ILR at PHC maximum three times
- *Any vaccine (barring OPV and YF vaccine), if accidently frozen*: DISCARD IT

312. Ans. (c) Measles *[Ref. Park 23/e p146]*

	Active Immunity	Passive Immunity
Definition	Immunity as a result of antibody production in the body. It depends on humoral and cellular responses of host	The host body does not produce it's own but depends on ready-made antibodies to be transferred to it
Modes of acquiring	*Following* clinical infection, *Following* subclinical/inapparent infection *Following* immunization with an antigen	*Administering* immunoglobulin/antiserum *Transplacental transfer* of antibodies *Transfer of lymphocytes*

313. Ans. (a) Rubella *[Ref. Park 23/e p103]*

Also Remember

- *Rubella (German Measles)*:
  - Causative agent: RNA virus of Togavirus family
  - Incubation period: 14 – 21 days (~18 days)
  - There is 'no known carrier state' for post-natally acquired rubella
  - 40% women in reproductive age group are susceptible to rubella in India
  - Rubella vaccine: live attenuated, 'strain RA 27/3'

Contd...

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Contd...

- *Vaccines contraindicated in Pregnancy*: ALL LIVE VACCINES (barring Yellow Fever Vaccine) and MENINGOCOCCAL VACCINE
  - BCG
  - OPV
  - Yellow fever
  - Measles vaccine
  - MMR (Measles, Mumps & Rubella)
  - Oral Typhoid (Ty 21a)
  - Varicella
  - Live Plague vaccine
  - LAIV (Live attenuated Influenza viral vaccine)
  - Varicella vaccine
  - Meningococcal Vaccine
- *'Live vaccines are usually not given in pregnancy'* due to the potential risk of causing the disease in the immunoconpromised mother:
  - However, when the likelihood of disease exposure is high or when infection would pose a risk to the mother or fetus, then vaccination with a live vaccine is generally recommended in exceptional cases (especially with OPV and Yellow Fever vaccines)
- *What if a live vaccine is accidentally given during pregnancy? Does this mean that the pregnancy should be terminated?* **No**. This alone would not be considered a medical reason to end a pregnancy because the chance of the fetus being infected is generally very low: Counseling by a knowledgeable healthcare provider would be recommended

314. Ans. (d) Horse *[Ref. Park 23/e p107]*

- *Antisera (Antitoxins)*: Materials prepared in animals; non-human sources like horses
  - Provides passive immunization
  - Common uses: Tetanus, Diphtheria, Botulism, Rabies, Gas gangrene, Snake bite

315. Ans. (d) Aluminium *[Ref. Park 23/e p162]*

316. Ans. (b) Sabin polio vaccine *[Ref. Park 23/e p103]*

317. Ans. (b) Sabin polio vaccine *[Ref. Park 23/e p11]*

- *Rare vaccine reactions*:

Vaccine	Reaction
BCG	Suppurative lymphadenitis, Osteitis, Disseminated infection
Hepatitis B	Anaphylaxis
Measles/ MMR	Febrile seizures, Thrombocytopenia, Anaphylaxis, Encephalopathy
OPV	Vaccine associated paralytic Poliomyelitis (VAPP)
TT	Brachial neuritis, Anaphylaxis
Pertussis (whole cell)	Persistent screaming, Seizures, Anaphylaxis, Encephalopathy, Hypotonic hyporesponsive episode (HHE)

Also Remember

ADVERSE EFFECTS FOLLOWING IMMUNIZATION (AEFI):

- *Minor Vaccine Reactions*:

Vaccine	Possible minor reaction	Frequency
DPT	Local reaction (pain, swelling, redness)	Up to 50%
	Fever	Up to 50%
Hepatitis A	Local reaction (pain, swelling, redness)	Up to 50%
Pneumococcal	Local reaction (pain, swelling, redness)	30-50%
Meningococcal	Mild local reactions	Up to 71%

Contd...

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Contd...

- *Rare vaccine reactions*:

Rare reactions	Vaccine
Suppurative lymphadenitis BCG osteitis Disseminated BCGiosis	BCG
Anaphylaxis	Hepatitis B
Thrombocytopenia Febrile seizures Anaphylaxis Encephalopathy	Measles/ MMR
Arthralgia	Rubella/ MMR
Vaccine associated paralytic poliomyelitis	OPV
Anaphylaxis Brachial neuritis	Tetanus/ DT
Seizures Anaphylaxis Encephalopathy Persistent (>3 hours) inconsolable screaming Hypotonic hypo-responsive episode (HHE)	Pertussis/ DPT-whole cell

318. Ans. (a) Colostrum *[Ref. Park 23/e p539]*

COLOSTRUM:

- Is the most suitable food immediately after birth of the baby; Regular milk comes 3 – 6 days after birth
- Also known as *'Beestings'*, *'First milk'* or *'Immune Milk'*
- High in carbohydrates, protein, and antibodies and low in fat
- Contains all five immunoglobulins found in all mammals, IgA, IgD, IgE, IgG and IgM
- Known as *'first immunization'* of newborn

319. Ans. (d) Hib *[Ref. Park 23/e p123]*

320. Ans. (d) Intradermally *[Ref. Park 23/e p196]*

321. Ans. (c) Two live vaccines cannot be given simultaneously *[Ref. Park 23/e p103]*
[New Guideline: Two live vaccines can be given together except choleea vaccine and Y F vaccine]

322. Ans. (a) Tetanus *[Ref. Park 23/e p277]*

323. Ans. (a) BCG; (b) Oral Polio Vaccine; (c) Chickenpox vaccine; (d) MMR *[Ref. Park 23/e p103]*

324. Ans. (a) BCG; (c) DPT; (d) Measles; (e) TT *[Ref. Park 23/e p109]*

325. Ans. (a) Measles – Jeryll Lynn; (b) Rubella - Copenhagen; (c) Mumps - Schwatrz *[Ref. Park 23/e p148, 153, 155]*

326. Ans. (b) BCG; (c) Yellow fever; (d) Mumps *[Ref. Park 23/e p103]*

327. Ans. (a) It is a killed vaccine *[Ref. Park 23/e p103]*

328. Ans. (d) Bivalent & quadrivalent *[Ref. Internet]*

- Currently two Human Papilloma Virus (HPV) vaccines are available in India as a protection against cervical cancer
- *Gardasil vaccine*: HPV types 6, 11, 16, 18 (Quadrivalent)
- *Cervarix vaccine:* HPV types 16, 18 (Bivalent)

329. Ans. (b) Measles *[Ref. Park 23/e p148]*

- *Measles vaccine efficacy with single dose*: 90%
- *OPV vaccine efficacy with single dose*: 65-80%
- BCG vaccine efficacy with single dose: 50%
- TT vaccine efficacy with single dose: 70%
- Rubella vaccine efficacy with single dose: 95% (HIGHEST)

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330. Ans. (b) Measles, Mumps, Rubella *[Ref. Park 23/e p119]*

331. Ans. (d) WHO recommends Donish 1331 for vaccine production *[Ref. Park 23/e p196]*

- New guidelines say that site for BCG vaccine must NOT be cleaned with spirit as it kills the live components of a vaccine

332. Ans. (c) Neomycin is used as preservative in BCG vaccine *[Ref. Park 23/e p148, 162, 196, 206]*

- DPT vaccine contains Thiomersal (Preservative)
- OPV contains Magnesium chloride (Thermostabilizer)
- DPT contains Aluminum hydroxide (Adjuvant)
- Measles vaccine contain Neomycin and Erythromycin (Preservative)
- BCG vaccine does not contain preservative

333. Ans. (b) *H. influenzae* vaccine *[Ref. Immunization in Older Adults, Issue 21, 2007]*

CDC GUIDELINES FOR IMMUNIZATION OF OLDER PEOPLE

- Influenza intramuscular inactivated vaccine (live intranasal vaccine is contraindicated)
- Pneumococcal vaccine once
- Tetanus-diphtheria toxoid (Td) booster every 10 years
- In selected patients aged 60 years or more
  - Herpes zoster (shingles)
  - Hepatitis A
  - Hepatitis B
  - Meningococcal disease
  - Varicella
  - MMR
  - Yellow fever vaccine (for travellers)

Also Remember

- Haemophilus influenza B vaccine is generally not given after 5-6 years age, unless there is HIV/AIDS, removal of spleen, Sickle cell disease, anti-cancer treatment or bone marrow transplant.

334. Ans. (b) 4 *[Ref. Immunization Handbook by Medical Officers, MoHFW, 2009; p50]*

- *A vaccine carrier*: 4 fully frozen ice-packs
- *A day carrier*: 2 fully frozen ice-packs

335. Ans. (c) Ice lined refrigerator *[Ref. Park 23/e p109]*

336. Ans. (c) Hepatitis B; (e) Rabies *[Ref. K. Park 23/e p119]*

337. Ans. (a) ILR *[Ref. K. Park 23/e p109]*

338. Ans. (d) DPT *[Ref. K. Park 23/e p123]*

339. Ans. (a) Live attenuated *[Ref. K. Park 23/e p103]*

340. Ans. (d) 6-9 months *[Ref. K. Park 23/e p148]*

341. Ans. (a) Jeryll Lynn *[Ref. K. Park 23/e p153]*

342. Ans. (d) Yellow fever *[Ref. K. Park 23/e p119]*

343. Ans. (b) At birth *[Ref. K. Park 23/e p23]*

344. Ans. (b) 10 *[Ref. Immunization for Children by M Aggarwal, 2/e p35]*

345. Ans. (a) Hepatitis B vaccine *[Ref. Textbook of Paediatric Nursing by Beevi, 1/e p41]*

346. Ans. (b) Type 7 *[Ref. Cervical Cancer by TS Kuie, 1/e p90-91]*

347. Ans. (d) 0, 7, 28 days *[Ref. K. Park 23/e p280]*

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348. Ans. (d) DPT + Vitamin A *[Ref. K Park 23/e p123]*
Recent changes in immunization guidelines in India
- 2 doses of measles vaccine
  - First dose: 9 months
  - Second dose: 16-24 months
- 1 dose of JE Live vaccine: 16-24 months
- DPT Booster: 5-6 years age
- Vitamin A: Every 6 months till age of 5 years age (Starting at 9 months age)

349. Ans. (a) Hepatitis A *[Ref. K. Park 23/e p103]*

350. Ans. (d) 0, 1, 6 months *[Ref. K. Park 23/e p216]*

351. Ans. (a) Follow up of AFP every 30 days *[Ref. K. Park 23/e p206-210]*

352. Ans. (a) >0.01 IU/ml *[Ref. K. Park 23/e p312]*

353. Ans. (a) Ty21 A *[Ref. K. Park 23/e p233]*

354. Ans. (c) Tetanus *[Ref. K. Park 23/e p312]*

355. Ans. (c) 300,000 TCID 50 *[Ref. K. Park 23/e p206]*

356. Ans. (b) P1 & P3 *[Ref. Vaccines by Plotkin, 6/e p 619]*

357. Ans. (a) Cell culture derived live attenuated *[Ref. K Park 23/e p286]*
- SA 14-14-2 vaccine:
  - Live attenuated cell-derived vaccine strain
  - Single dose is sufficient
  - Gives protection for 11 years
- Killed Mouse-brain derived vaccine:
  - Two primary doses 4weeks apart
  - Booster after 1 year, then at 3-yearly intervals
  - Useful in Inter-epidemic period

358. Ans. (a) Bivalent and quadrivalent; (c) MC subtypes 16, 18

359. Ans. (a) MMR *[Ref. K. Park, 23/e p114]*

360. Ans. (b) Maternal antibody is completely protective *[Ref. Park 23/e p206]*

361. Ans. (d) Live J.E. *[Ref. Infectious Diseases in Children and Newer Vaccines by Ghosh, 1/e p142]*

362. Ans. (a) Children under 8 years *[Ref. Park 23/e p103]*

363. Ans. (d) Influenza *[Ref. Vaccinophobia by Chatterjee, 1/e p225]*

EGG-ALLERGY IN VACCINEES
- Underlying reason: Ovalalbumin (main protein in egg white) is responsible for allergic reaction may be found in vaccines cultured on egg
- Vaccines containing Egg-proteins (Contraindicated in Egg allergy):
  - Rabies vaccine
  - Yellow fever vaccine
  - Herpes simplex vaccine
  - Tick encephalitis vaccine
  - MMR vaccine
  - Influenza vaccine

Also Remember
- MMR vaccine: Propagated on Chick embryo fibroblasts (containing very lesser amounts of protein) so is incapable of causing allergic reaction hence it's NOT contraindicated in egg allergy patients

364. Ans. (d) Maternally derived antibodies *[Ref. Microbiology and Infectious Disease by Hagan & Bruner, 8/e p510]*
- *Primary vaccination failure*: Failure to serologically respond to vaccine
  - Too young age where Maternal antibodies interfere (MC Cause)
  - Vaccine production problems

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- Cold chain failure
- Inappropriate administration technique
- Immunodeficiency
- Poor health

- *Secondary vaccination failure*: 'Waning immunity' where there is loss of vaccine induced protection in an individual who had previously seroconverted to vaccination
  - Causes are not well understood

365. Ans. (a) Hepatitis B vaccine *[Ref. Viruses, Plagues and History by Oldstone, 1/e p37]*
- First recombinant vaccine for humans made in yeast: Hepatitis B
- Hilleman, Merck Sharp & Dohme Inc. developed it in 1984

366. Ans. (b) Additive action of the two antigens *[Ref. Park 23/e p162]*

367. Ans. (a) 1 only *[Ref. Park 23/e p103]*

368. Ans. (b) DPT *[Ref. Park 23/e p112]*

369. Ans. (a) 7-14 *[Ref. Human Viral Pathogens by Liu, 1/e p79]*
- *Vaccine associated paralytic poliomyelitis (VAPP)*: Develop Paralytic Polio after 4-30 days (Average 7-14 days) of administration of OPV
- *Poliomyelitis among Contacts of OPV*: Develop within 7-60 days after exposure to recent OPV-recipient

370. Ans. (b) H2N1 *[Ref. Infectious Diseases by Blaser, 8/e p3534]*

TRIVALENT FLU VACCINE
- *Type*: Inactivated Influenza vaccine
- *Protection*:
  - Two influenza A viruses (an H1N1 and an H3N2)
  - An influenza B virus
- *Types of Trivalent vaccine*:
  - Standard-dose trivalent shots: Approved for people of different ages
  - High-dose trivalent shot: Approved for people 65 and older.
  - Trivalent shot: Approved for people 18 and older
  - Recombinant trivalent shot: Approved for people 18 years and older

371. Ans. (c) 8-15°C *[Ref. Pharmaceutical Packaging Technology by Hall, 1/e p9]*
- *Store frozen temperature*: Below -20°C
- *Cold chain temperature (Vaccines)*: 2-8°C
- *Cool storage*: 8-15°C
- *Store at room temperature*: 15-25°C
- *Store at ambient temperature*: 15-25°C
- *Controlled room temperature*: 20-25°C
- *Warm temperature*: 30-40°C
- *Excessive heat*: >40°C

Review Questions

372. Ans. (c) +2°C to 8°C *[Ref. Park 23/e p109]*

373. Ans. (b) Droplet *[Ref. Park 23/e p316]*

374. Ans. (b) 10 days *[Ref. Park 23/e p283]*

375. Ans. (c) Given around 200 yards of a case detected *[Ref. Refer Dictionary by Dr. J Kishore]*

376. Ans. (d) Yellow fever *[Ref. Park 23/e p103]*

377. Ans. (a) Pertussis component *[Ref. Park 23/e p162]*

378. Ans. (c) 15–18 months *[Ref. Park 23/e p153]*

379. Ans. (a) Typhoid oral *[Ref. Park 23/e p237-238]*

380. Ans. (a) OPV+ BCG + Measles + DPT *[Ref. Park 23/e p123]*

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381. **Ans. (c) Inner square darker than the outer circle** *[Ref. Park 23/e p110]*
382. **Ans. (c) 4°C** *[Ref. Park 23/e p109]*
383. **Ans. (a) BCG** *[Ref. Park 23/e p196]*
384. **Ans. (d) Production of antibody more slow** *[Ref. Park 23/e p101]*
385. **Ans. (a) The micro-organism produces exotoxins** *[Ref. Park 23/e p105]*
386. **Ans. (a) Salk polio vaccine** *[Ref. Park 23/e p103]*
387. **Ans. (a) Given subcutaneously** *[Ref. Park 23/e p196]*
388. **Ans. (c) IgA** *[Ref. Park 23/e p106]*
389. **Ans. (c) Influenza** *[Ref. Park 23/e p155]*
390. **Ans. (c) Rubella** *[Ref. Park 23/e p151]*
391. **Ans. (c) Protects entire community** *[Ref. Park 23/e p102]*
392. **Ans. (b) BPL vaccine has more number of doses** *[Ref. Park 23/e p280]*
393. **Ans. (a) Measles; (d) Diphtheria** *[Ref. Park 23/e p103]*
394. **Ans. (b) 4 weeks** *[Ref. Park 23/e p103]*
395. **Ans. (d) Rubella** *[Ref. Park 23/e p103]*
396. **Ans. (c) Measles** *[Ref. Park 23/e p108]*
397. **Ans. (a) OPV** *[Ref. IAP Guidebook on Immunization]*
398. **Ans. (b) Measles** *[Ref. Park 23/e p148]*
399. **Ans. (d) Tetanus** *[Ref. Park 23/e p313]*
400. **Ans. (c) Danish-1331** *[Ref. Park 23/e p196]*
401. **Ans. (a) Typhoid** *[Ref. Park 23/e p237-238]*
402. **Ans. (c) Measles** *[Ref. Park 23/e p123]*
403. **Ans. (b) 40 i.u.; (a) 20 i.u.** *[Ref. Park 23/e p280]*
404. **Ans. (a) Dengue fever** *[Ref. Microbiology by C.P. Baveja p 475, Park 21/e p231, Park 22/e p232]*
405. **Ans. (b) Measles** *[Ref. Park 23/e p148]*
406. **Ans. (b) Live attenuated** *[Ref. Park 23/e p103]*
407. **Ans. (b) Intradermal** *[Ref. Park 23/e p196]*
408. **Ans. (c) 5** *[Ref. Park 23/e p223]*
409. **Ans. (b) Killed** *[Ref. Park 23/e p103]*
410. **Ans. None of the choices** *[Ref. Park 23/e p123-124]*

DISINFECTION

411. **Ans. (d) Germicidal Power of a disinfectant** *[Ref. Russell, Hugo and Ayliffe's Principles and Practice of Disinfection; p225]*
    - *Rideal Walker Coefficient (RWC)*:
        - Also known as *'Carbolic acid coefficient'*
        - Is used to *'represent germicidal power of a disinfectant'*
        - *Standard used for comparison*: Phenol (RWC = 1)
        - *RWC = 10 implies*: Given disinfectant is 10 times more potent than phenol
        - *Organism used for testing*: Salmonella typhi
        - *In presence of organic matter, RWC is ineffective*: Chic Martin test is employed

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Also Remember

- *Effect/ sufficiency/ adequacy of autoclaving is assessed by*:
  - Spores of 'Bacillus stearothermophilus'
  - Sterigage (chemical indicator strips)
- *Effect/ sufficiency/ adequacy of pasteurization is assessed by*:
  - Phosphatase test (MC used test)
  - Standard plate count
  - Coliform count

412. Ans. (c) Phenol *[Ref. Russell, Hugo and Ayliffe's Principles and Practice of Disinfection; p225]*

413. Ans. (b) Cetrimide *[Ref. Park 23/e p126-130]*

- *Chemical agents for disinfection*:

Phenol & related compounds	Quaternary ammonia compounds	Halogens & related compounds
Phenol *Crude phenol* *Cresol* *Cresol emulsions* *Chlorhexidine (Hibitane)* *Hexachlorphane* *Dettol*	Cetrimide Savlon	Bleaching powder Sodium hypochlorite Halozone tablets Iodine Iodophors
Alcohols	**Formaldehyde**	**Miscellaneous**
Ethyl alcohol Isopropyl alcohol	Formalin Formaldehyde gas	Lime Ethylene oxide

- *Pure phenol is not an effective disinfectant*
- *Crude phenol*: Phenol + Cresol
- Cresol emulsions are very powerful disinfectants:
  - Lysol (50 – 60% cresol)
  - Izal
  - Cyllin
- *Dettol (Chlorxylenol)*: Suitable for disinfection of instruments and plastic equipments
- *Savlon*: Cetavlon (Cetrimide) + Hibitane (Chlorhexidine)
- *Betadine*: Povidone + Iodine
- *Bleaching powder* ($CaOCl_2$):
  - BP contains *'33% available chlorine'*
  - *Stabilised bleach*: Mixing with lime, to stabilize bleaching powder
  - *Amount of BP required to disinfect 1000 litres of water*: 2.5 grams

Also Remember

- *Most effective skin antiseptics*: Alcoholic solutions of Chlorhexidine (Hibitane) & Iodine
- Cresol is known as *'All purpose general disinfectant'*
- *Cheapest disinfectant*: Lime
- *Disinfectants recommended*:
  - *For rooms: Formaldehyde*
  - *For Lippes loop:*
    1. 1/2500 aqueous solution of Iodine
    2. Normal strength savlon–
  - *For Handlotions:* Hibitane (Chlorhexidine)
  - *For infant feeding bottles:* Sodium hypochlorite (containing 100 – 200 ppm of available chlorine)
  - *For sputum:* Burning

414. Ans. (c) Cetavlon and hibitane *[Ref. Park 23/e p126-130]*

- *Savlon*: Chlorhexidine (*Hibitane*) 0.3% and Cetrimide (*Cetavlon*) 3%.
- Chlorhexidine is effective against a wide range of Gram-negative and Gram-positive vegetative bacteria, yeasts, dermatophyte fungi and lipophilic viruses; It is inactive against bacterial spores, except at elevated temperatures

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Also Remember

- Chlorxylenol/ parachlorometaxylenol is the major content of 'Dettol'

415. Ans. (d) Cresol *[Ref. Park 23/e p128]*

- Cresol has no significant activity against bacterial spores

416. Ans. (d) Pre-current disinfection *[Ref. Park 23/e p127]*

TYPES OF DISINFECTION:

- *Concurrent disinfection*: Is application of disinfective measures as soon as possible after discharge of infectious material from body of an infected person
  - *Example*: Disinfection of urine, faeces, vomit, contaminated linen, clothes, hands, dressings, gloves, aprons
- *Terminal disinfection*: Is apllication of disinfective measures after the patient has been removed by death or to a hospital or ceased to be a source of infection
  - *Examples*: Currently not practices; only cleaning, airing, sunning of rooms, linen, furniture
- *Precurrent (Prophylactic) disinfection*: Prior to occurrence of infection
  - *Examples*: Chlorination of water, pasteurization of milk, handwashing

417. Ans. (a) Boiling; (b) Burning; (d) Autoclaving *[Ref. Park 23/e p127, 128]*

- *Methods recommended for sputum disposal*:
  - Burning (after receiving in gauge/ handkerchief)
  - Boiling or Autoclaving at 20 lbs pressure X 20 min (for large volumes, as in TB hospitals) or incineration
  - 5% Cresol in a cup made to stand for 1 hour after spitting sputum in it

418. Ans. (a) Cetrimide + chlorhexidine *[Ref. Park 23/e p128]*

419. Ans. (d) Washing of hands before and after attending the patients *[Ref. Park 23/e p359]*

MAIN PREVENTIVE MEASURES FOR NOSOCOMIAL INFECTIONS:

- Isolation of infectious patients
- Hospital staff infected must be kept away from work till cure; hygiene; aprons
- *"Hand-washing with disinfectants"* (not soap and water) as MOST COMMON ROUTE OF INFECTION is hands
- Dust control: Wet dusting and vaccum cleaning
- Disinfection: Patient articles and body fluids; instruments
- Control of droplet infection: Face mask; bed spacing; Lighting; Ventilation
- Nursing techniques: Barrier nursing; Task nursing
- Administrative measures: Hospital committee on infection control

420. Ans. (d) Chlorhexidine *[Ref. Park 23/e p128]*

- *Recommended disinfection measures for sputum*: **[Mnemonic: AB²C]**
  - Autoclaving (20 min X 20 lbs pressure)
  - Burning
  - Boiling
  - 5% Cresol (X 1 hour)
- *Chlorhexidine (Hibitane)*: Is a skin antiseptic RECOMMENDED FOR burns and hand disinfection

421. Ans. (c) Bacillus stearothermophilus *[Ref. Modern trends in planning and designing of hospitals, 1/e p189]*

AUTOCLAVING

- *Principle*: Steam under pressure
- *Methods of autoclaving*:

Results of a screening test for a disease		Disease	
		Present	Absent
Results	Positive	99	10
	Negative	1	90

- *Checking sufficiency of autoclaving*:
  - Spores of Bacillus stearothermophilus
  - Chemical colour indicator strips (Sterigage)

422. Ans. (a) 50 gm/lit *[Ref. K. Park 23/e p130]*

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423. Ans. (b) Sodium hypochlorite *[Ref. K. Park 23/e p129]*

424. Ans. (c) Hot air oven *[Ref. K. Park 23/e p127]*

425. Ans. (c) After 48 hours of hospitalization *[Ref. Park 23/e p359]*

426. Ans. (d) Hot air oven 160 degrees Celsius for 30-60 minutes *[Ref. Microbiology by Fornica, 1/e p89]*

427. Ans. (c) Hypochlorite *[Ref. Endodontics by Bakland, 1/e p83]*

428. Ans. (d) Autoclaving *[Ref. Microbiology & Immunology by Parija, 2/e p27]*

STERILIZATION BY HEAT

Sterilization by Dry Heat	Sterilization by Moist Heat
Flaming Hot air oven Incineration	Pasteurization Boiling, Steam sterilizer Autoclaving Tyndallisation

Review Questions

429. Ans. (b) Kills bacteria only *[Ref. Park 23/e p125]*

430. Ans. (a) Glutaraldehyde *[Ref. Ananthanarayan Microbiology 4/e p32]*

MISCELLANEOUS

431. Ans. (a) Temporal association *[Ref. Epidemiology by Leon Gordis, 4/e p172 and Basic Epidemiology by Beaglehole, WHO; p40-41]*

NESTED CASE CONTROL STUDY:

- Is a hybrid design where *'a case control study is nested in a cohort study'*
- *Is predominantly a type of Cohort study* (due to forward direction)
- Usefulness limited for studies involving *'rare diseases AND whose diagnostic tests are very expensive'*
- *Study design*:
  - A population is identified and baseline data is obtained from interviews, blood or urine tests, etc.
  - Population is then followed up for a period of time (Cohort study) for development for the disease under study
  - A Case control study is then carried out:
    1. Cases: people who developed the disease
    2. Controls: Sample from those who did not develop the disease
  - Samples/history collected at baseline are then examined
- *Advantages*:
  - *Elimination of problem of Recall bias*: Interviews are performed at the beginning of the study (at baseline), and data are obtained before the disease has developed
  - *Maintenance of temporal association*: If any disease or abnormality in a biological characteristic is noted, it is more likely that it represent risk factors or other pre-morbid characteristics rather than a manifestation of early, sub-clinical disease
  - *Economical to conduct*: Expensive tests need not be conducted on entire population; only carried out among cases and controls

432. Ans. (b) Effectiveness *[Ref. Epidemiology by Leon Gordis, 4/e p267]*

EVALUATION OF HEALTH SERVICES:

- *Efficacy*: Is the effect or usefulness of an agent/ drug/ vaccine under ideal 'controlled laboratory' conditions
- *Effectiveness*: Is the effect or usefulness of an agent/ drug/ vaccine in real life community situations
- *Efficiency*: Is the measure of relationship between the results achieved and the effort expended in terms of money, resources and time
  - *Efficiency*: Output/ Input

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- *Evaluation of efficiency*:
  1. *Cost-benefit analysis*: Both input as well as output is in monetary terms
  2. *Cost-effectiveness analysis*: Input is in monetary terms whereas output is in terms of 'no. of lives saved'

Also Remember

- Measurement of efficiency requires many assumptions, it is not value-free and can serve only as a general guideline
- *Cost-effectiveness analysis is expressed as*:
  - Dollars per life years gained
  - Dollars per case prevented
  - Dollars per quality-adjusted life years gained
- Cost-effectiveness analysis is easier to perform than Cost-benefit analysis

433. Ans. (a) Case series report *[Ref. Epidemiology by Leon Gordis, 2/e p102]*

- *Exposure and outcome in analytical studies*:

Exposure	Outcome	Remarks	Direction	
Prospective cohort study	Occurred	Followed-up	Start with exposure	Forward looking
Retrospective cohort study	Occurred	Occurred	Start with exposure	Forward looking
Mixed cohort study	Occurred	Occurred; further assessed in future	Start with exposure	Forward looking
Case control study	Occurred	Occurred	Start with outcome	Backward looking
Cross sectional study	Occurred	Occurred	Both exposure and outcome assessed at a point of time	Neither forward looking nor backward boking

- *In a Prospective cohort study, Outcome has not yet occurred when the study has begun*: Only exposure has occurred; we look for development of same disease in both exposed and non-exposed groups
- *In a Retrospective cohort study, both exposure as well as outcome have occurred when the study has begun*: First we go back in time and take only exposure into consideration (cohorts identified from past hospital/ college records), then look for development of same disease in both exposed and non-exposed groups
- *In a Combined prospective-retrospective cohort study, both exposure as well as outcome have occurred when the study has begun*: First we go back in time and take only exposure into consideration (cohorts identified from past hospital/ college records), then look for development of same disease in both exposed and non-exposed groups; later cohort is followed prospectively into future for outcome
- *In a Case control study, both exposure as well as outcome have occurred when the study has begun*: First we take outcome into consideration, and then go back in time taking exposure into consideration; then compare exposure in both diseased (cases) and non-diseased (controls)
- *In a nested case control study,* only exposure has occurred when the study begins; when the disease develops in a population, then 2 groups of cases (diseased) and controls (non-diseased) are formed and their exposure status is compared
- *In a case-series study, both exposure as well as outcome have occurred when the study has begun*: First we take outcome into consideration, and then go back in time taking exposure into consideration; there is NO COMPARISON with non-diseased (controls)
- *In a prevalence survey (cross-sectional study),* exposure as well as outcome may co-exist at the time of study (there is no longitudinal direction)

In the given question, a total of 5000 patients of glaucoma are identified and surveyed by patient interviews regarding family history of glaucoma,

Since *both exposure as well as outcome have occurred when the study has begun*: First we take outcome into consideration, and then go back in time taking exposure into consideration; and there is NO COMPARISON with non-diseased (controls),

Therefore, it is a case series report

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434. Ans. (d) Nothing can be concluded as the information given is inadequate *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p141 and Methods in Biostatistics by Mahajan, 6/e p118]*

- **In the given question**, In assessing the association between maternal nutritional status and the birth weight of the newborns, two investigators A and B studied separately and found significant results with p values 0.02 and 0.04 respectively
- Only levels of significance are given, thus we can only conclude that investigator A has 98% chance of being correct whereas investigator B has 96% chance of being correct

435. Ans. (a) Is a cohort study nested in a case control study *[Ref. Epidemiology by Leon Gordis, 4/e p172 and Basic Epidemiology by Beaglehole, WHO; p40-41]*

436. Ans. (b) 99% *[Ref. Park 23/e p139]*

437. Ans. (b) Effectiveness *[Ref. Epidemiology by Leon Gordis, 4/e p267 and Basic Epidemiology by Beaglehole, WHO; p137]*

Also Remember

- COMMUNITY EFFECTIVENESS (CE):
  CE = Efficacy × Diagnostic accuracy × Patient compliance × Provider compliance × Coverage
  (E × D × PtC × PrC × C)

438. Ans. (b) Specific protection *[Ref. Park 23/e p41]*

Also Remember

- If a pregnant female is found to be anemic (by hemoglobin estimation), she is given 2 or 3 tablets of IFA per day as treatment: This will now become a Secondary Level of prevention (diagnosis and treatment)
- *Primordial Level is Best level of prevention for Non-communicable diseases*
- Primary level of prevention is applied when *'risk factors are present but disease has not yet taken place'*
  - It signifies 'intervention in the Pre-pathogenesis Phase of a disease/ health problem'
- Secondary level of prevention is applied when disease has possibly set in: It attempts to arrest the disease process, seek unrecognized disease & treat it before irreversibility and reverse communicability of infectious diseases
  - National Health Programmes by Govt. of India mostly operate at Secondary level of prevention
  - Secondary prevention is *an imperfect tool in control of transmission of disease*. It is more expensive and less effective than primary prevention
  - It is an important level of prevention for disease like Tuberculosis, Leprosy and STDs

439. Ans. (b) It is likely to be more for infections that do not have a sub-clinical phase *[Ref. Park 23/e p102]*

HERD IMMUNITY:

- *Herd Immunity* is the level of resistance of a community or group of people to a particular disease. It refers to group protection beyond what is afforded by the protection of immunized individuals
- *Elements contributing to herd immunity are*:
  - Occurrence of clinical/subclinical infections in herd
  - Immunization of herd
  - Structure of herd (hosts, alternative animal hosts, insect vectors, environmental & social factors)
- It is *'neither possible nor necessary to achieve 100% herd immunity'* to control a disease
- Herd immunity may be determined by *'Serological Surveys'*
- Herd immunity describes a type of immunity that occurs when the vaccination of the a portion of the population (or herd) provides protection to un-vaccinated individuals
- Herd immunity does not protect the individual in the case of tetanus
- *Herd Immunity Threshhold*: Virologists have found that when a certain percentage of a population is vaccinated, the spread of the disease is effectively stopped; This critical percentage (HIT) depends on the disease and the vaccine

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Disease	Herd immunity threshold
Diphtheria	85%
Pertussis	92-94%
Measles	83-94%
Mumps	75-86%
Rubella	80-85%
Polio	80-86%
Smallpox	83-85%

440. Ans. (a) & (c) Personal Exposure & Case Report *[Ref. BMJ 2004; p1490]*

441. Ans. (c) Natural experiment study *[Ref. Modern Epidemiology by Rothman, 3/e p94]*

442. Ans. (a) Descriptive studies *[Ref. K. Park 23/e p63]*

443. Ans. (c) Family planning *[Ref. India's Population by Mitra, 1/e p631]*

Review Questions

444. Ans. (d) Stool specimen of polio send for testing *[Ref. Park 23/e p203]*

445. Ans. (c) Sullivan's index *[Ref. Park 23/e p26]*

446. Ans. (b) Good for community *[Ref. Dorland's Dictionary 30/e p1502, Jawetz 23/e p681, Park 22/e p98]*

447. Ans. (d) Cross over study; (b) Case control study *[Ref. Park 23/e p71]*

448. Ans. (c) Epidemiological surveillance *[Ref. Park 21/e p90, Park 22/e p91]*

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CHAPTER

4 Screening of Disease

CONCEPTS IN SCREENING

Screening of Disease

- *Screening test:* Is used to search for an unrecognized diseases or defect, in apparently healthy individuals, by means of rapidly applied tests, examinations or other procedures
- *Sssscreening versus Diagnosis*[Q]*:*

	Screening	Diagnosis
Done on	Apparently healthy	Cases (signs/ symptoms)
Applied on	Groups, populations	Individuals
Test results	Arbitrary & final	Not final, modifiable
Based on	One criterion (cut-off)	Signs, symptoms, lab findings
Cost	Relatively cheaper	Expensive
Time taken	Relatively rapid	Time-consuming
Accuracy	Relatively inaccurate	Accurate
Basis for treatment	Cannot be used as basis	Useful basis for treatment
Initiative from	Investigator	Case with complaint

- *Examples of important screening tests used*[Q]:

Screening Test(s)	Disease screened
*Papanicolaou (Pap) smear test, VIA**	Cervical cancer
Breast self examination (BSE)	Breast cancer
Mammography	Breast cancer
Bimanual oral examination	Oral cancer
ELISA, RAPID, SIMPLE	HIV (National AIDS Control Programme)
Urine for Sugar, Random blood sugar	Diabetes mellitus
AFP (alpha feto-protein)	Developmental anomalies in fetus
Digital rectal examination (DRE)	Prostate cancer
Prostate specific antigen (PSA)	Prostate cancer
Fecal occult blood test	Colorectal cancer

(*Visual Inspection with 5% Acetic acid)

Principles of Screening (WHO): Suitability of a Disease for Screening (Criteria)[Q]

- The disease should be an important health problem
- There should be an effective treatment available for the disease
- Facilities for diagnosis and treatment should be available
- There should be a latent or early asymptomatic stage of the disease
- There should be a test or examination for the diagnosis of disease
- The test should be acceptable to the population
- The natural history of the disease should be adequately understood
- There should be an agreed policy on who to treat
- The total cost of finding a case should be economically balanced in relation to medical expenditure as a whole
- Case-finding should be a continuous process, not just a 'once and for all' project

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TYPES OF SCREENING

Types of Screening[Q]

	Prescriptive screening	Prospective screening
Definition	People screened for own's benefit	People screened for other's benefit
Essential purpose	Case detection	Disease control
Request for screening	No specific request	Specific request from authority
Example(s)	Neonatal screening Pap smear Urine for sugar	Screening of immigrants HIV screening among Sex workers

Neonatal Screening (NNS)

I Most common neonatal disorder to be screened is Neonatal hypothyroidism

- *Neonatal hypothyroidism (NNH):*
  - *Most common neonatal disorder to be screened is Neonatal hypothyroidism (NNH)*[Q]
  - *Blood sample of choice: Umbilical cord blood*[Q]
  - *Detection of: TSH, T_4*
- *Phenylketonuria (PKU):*
  - *PKU is an autosomal recessive trait* with a frequency of 1 in 10,000 births
  - *Enzyme deficient in PKU:* Phenylalanine hydroxylase[Q]
  - *Treatment of PKU:* restricting or eliminating foods high in phenylalanine, such as breast milk, meat, chicken, fish, nuts, cheese, legumes and other dairy products
  - *Guthrie Test*[Q]*:* Is done in neonates for mass screening of Phenylketonuria (PKU)
    - *Guthrie test was the first screening test used in neonates*
    - *Blood sample* is collected by heel prick of the baby 7 -10 days after birth[Q]
    - *Guthrie Test is negative* in first 0 – 3 days of life
    - *Guthrie test can detect* PKU, Galactosemia and Maple syrup urine disease
    - *Chemicals detected*: Phenylalanine, Phenylpyruvate and Phenyllactate
    - *It is a semi-quantitative test*
    - Currently, Guthrie test has been replaced by *Tandem mass Spectrometry* (TMS)

CRITERIA IN SCREENING

Results of Screening Test: Rules for Construction of 2 × 2 Table

- Always disease (present or absent) to be represented on the top-most row of the table
- Always screening test results (positive or negative) to be represented on the left-most column of the table
- Then only all formulae (for evaluation of screening test) can be applied

Results of a screening test for a disease		Disease	
		Present	**Absent**
Results	**Positive**	a (TP)	b (FP)
	Negative	c (FN)	d (TN)

- *'a' are known as True positive (TP):* Population having the disease and showing screening test results as positive
- *'d' are known as True negative (TN):* Population not having the disease and showing screening test results as negative
- *'b' are known as False positive (FP):* Population not having the disease but erroneously showing screening test results as positive
- *'c' are known as False negative (FN):* Population having the disease but erroneously showing screening test results as negative

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- *Total population having the disease, i.e. cases:* 'a + c' (True positive + False negative)
- *Total population not having the disease, i.e. healthy:* 'b + d' (False positive + True negative)

Results of Screening Test: Evaluation/Properties of a Screening Test[Q]

- *Sensitivity:* Ability of a screening test to identify correctly all those who have the disease (cases)

  Sensitivity = a/(a + c) × 100 = TP/(TP + FN) × 100
- *Specificity:* Ability of a screening test to identify correctly all those who do not have the disease (healthy)

  Specificity = d/(b + d) × 100 = TN/(TN + FP) × 100
- *Positive predictive value (PPV):* Ability of a screening test to identify correctly all those who have the disease, out of all those who test positive on a screening test

  PPV = a/(a + b) × 100 = TP/(TP + FP) × 100
- *Negative predictive value (NPV):* Ability of a screening test to identify correctly all those who do not have the disease, out of all those who test negative on a screening test

  NPV = d/(c + d) × 100 = TN/(FN + TN) × 100
- *Percentage of false positives (FP):*

  % FP = b/(b + d) × 100 = FP/(FP + TN) × 100
- *Percentage of false negatives (FN):*

  % FN = c/(a + c) × 100 = FN/(TP + FN) × 100

Positive Predictive Value (PPV)

- *Definition:* Ability of a screening test to identify correctly all those who have the disease, out of all those who test positive on a screening test

  PPV = a/(a + b) × 100 = TP/(TP + FP) × 100
- *PPV of a screening test depends on*[Q]:
  - Sensitivity
  - Specificity
  - Prevalence of disease in the population
- PPV of a screening test is directly proportional to prevalence of disease in the population
  - PPV α Prevalence of disease[Q]
  - As the prevalence of a disease increases in a population, PPV increases for the screening test

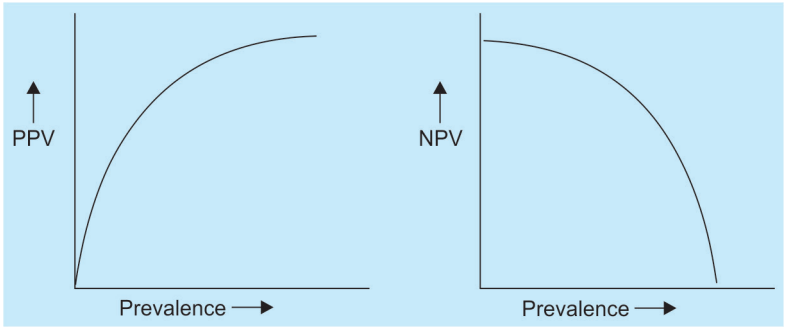

Figure: Prevalence and predictive value

I *Sensitivity:* Ability of a screening test to identify correctly all those who have the disease (cases)

I *PPV of a screening test depends on*[Q]:
- Sensitivity
- Specificity
- Prevalence of disease in the population

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Likelihood Ratio[Q]

- *Description:* Incorporates both the sensitivity and specificity of the test and provides a direct estimate of how much a test result will change the odds of having a disease
- *Likelihood ratio for a positive result (LR+)* tells you how much the odds of the disease increase when a test is positive

  $LR^+ = Sensitivity/(1 - Specificity)$

- *Likelihood ratio for a negative result (LR^-)* tells you how much the odds of the disease decrease when a test is negative

  $LR^- = (1 - Sensitivity)/Specificity$

- Post-test odds (the chances that patient has a disease): Once you have specified the pre-test odds (the likelihood that the patient would have a specific disease prior to testing), you multiply them by the likelihood ratio

  $Odds_{post} = Odds_{pre} \times$ Likelihood ratio

I

$LR^+ = Sensitivity/(1 - Specificity)$

Reliability/Precision/Repeatability/Consistency/Reproducibility[Q]

- *Definition:* Test gives consistent results when repeated more than once on the same individual or material, under the same conditions
- *Reliability is measured by:*
  - Pearson product-moment correlation coefficient
  - Cronbach's alpha (internal consistency)
- Reliability of a test depends on:
  - Observer variation:
    - *Intra-observer variation:* Same observer taking 2 or more readings give varied results
    - *Inter-observer variation:* Variation between different observers on same subject/material
  - *Biological (subject) variation:* occur due to
    - Changes in parameters observed
    - Variation in perceptions and answers of patients
    - Regression to the mean
  - *Errors relating to technical methods:* occur due to
    - Defective instruments
    - Erroneous calibrations
    - Faulty reagents
    - Inappropriate/unreliable test

Validity/Accuracy

- *Definition:* Refers to what extent the test measures which it purports to measure (adequacy of measurement)
- *Validity has 2 components:*
  - Sensitivity
  - Specificity
- *Types of Validity:*
  - *Conclusion validity:* Defines if there is a relationship between 2 variables
  - *Internal validity:* Assuming relationship between 2 variables, defines if it is causal
    - Is free of bias
    - Valid conclusions can be drawn for individuals in a sample

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- *Construct validity:* Assuming causal relationship between 2 variables, defines if our theory is best to our constructs
- *External validity:* Assuming causal relationship between 2 variables, defines if our theory can be generalized to the broader population
- *Concurrent validity:* refers to the degree of correlation with other measures of the same construct measured at the same time
- *Face (Logical) validity:* Relevance of a measurement appear obvious
- *Content validity:* Measurement of all variable components
- *Consensual validity:* If no. of experts agree to a parameter
- *Criterion validity:* If compared with a reference or gold standard
  - *Is best measure of validity*[Q]
  - *Usually expressed as sensitivity & specificity*[Q]
- *Discriminant validity:* If not showing strong correlation between 2 variables

I

Criterion validity: If compared with a reference or gold standard
- Is best measure of validity[Q]
- Usually expressed as sensitivity & specificity[Q]

Precision Versus Accuracy

	Precision	Accuracy
Definition	Repeatability, reliability, consistency, reproducibility of a test	Degree of closeness of a measured/ calculated quantity to its actual/ true value, Validity
Test(s)	Range chart R – chart	Mean chart Levy Jennings (LJ) chart[Q] Shewhart control chart

Screening Tests in Series & Parallel

- *Screening Tests Used in Series:* A population is subjected to one screening test followed by a second screening test; 2nd screening test is applied on those individuals only who test positive on the 1st screening test
  - *Combined sensitivity of 2 tests A & B in series:*

    = Sensitivity (A) X Sensitivity (B)
  - *Combined specificity of 2 tests A & B in series:*

    = [Specificity (A) + Specificity (B)] – [Specificity (A) X Specificity (B)]
- *Screening Tests Used in Parallel:* A population is subjected to two (or more) screening tests at the same time; each of the individuals is subjected to both (or all) screening tests
  - *Combined sensitivity of 2 tests A & B in parallel:*

    = [Sensitivity (A) + Sensitivity (B)] – [Sensitivity (A) X Sensitivity (B)]
  - *Combined specificity of 2 tests A & B in parallel:*

    = Specificity (A) X Specificity (B)

	Tests in series[Q]	Tests in parallel[Q]
Combined sensitivity	Decreases	Increases
Combined specificity	Increases	Decreases
Combined PPV	Increases	Decreases
Combined NPV	Decreases	Increases

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MISCELLANEOUS

Bayes' Theorem[Q]

- *Baye's Theorem:* Gives relationship between PPV of a screening test and Sensitivity, Specificity & Prevalence of disease in a population

$$PPV = \frac{[Sensitivity \times Prevalence]}{[Sensitivity \times Prevalence]+(1-Specificity)(1-Prevalence)} \times 100$$

- Actual *Baye's Theorem:* Gives relationship between Post-test probability of a disease in a population (PTP = PPV) and Sensitivity, Specificity & Pre-test probability of a disease in a population (pTP = Prevalence)

$$PTP = \frac{[Sensitivity \times pTP]}{[Sensitivity \times pTP] + [(1 - Specificity)\,(1 - pTP)]} \times 100$$

  - Post-test probability of a disease in a population (PTP) IS SAME AS PPV
  - Pre-test probability of a disease in a population (pTP) IS SAME AS Prevalence
- NPV is inversely proportional to Prevalence of disease in a population

$$NPV = \frac{[Specificity \times (1 - Prevalence)]}{[Specificity \times (1-Prevalence)] + [(1-Sensitivity) \times Prevalence]} \times 100$$

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MULTIPLE CHOICE QUESTIONS

CONCEPTS IN SCREENING

1. **There are several points in the course of a disease process:** *[AIIMS June 1998]*
   A – Disease onset
   B – Point of first possible detection
   C – Final critical point
   D – Usual time of diagnosis
   E – Final outcome

   For a screening programme to be effective, it should be applied between:
   (a) A and B
   (b) A and C
   (c) B and C
   (d) C and D

2. **Screening is the most commonly used epidemiological tool in school health services. Which level of prevention does it refer to?**
   (a) Primary *[AIIMS Nov 2006]*
   (b) Secondary *[DNB 2011]*
   (c) Tertiary
   (d) Primary and secondary

3. **In "Iceberg Phenomenon" the tip represents what the physician sees in clinical practice and submerged portion of the iceberg represents sub clinical cases, carriers, undiagnosed cases. Essential purpose of screening test for a chronic disease is to identify:** *[AIIMS Dec 1995]*
   (a) Tip of the iceberg *[Bihar 2004]*
   (b) Hidden portion of the iceberg
   (c) Both (a) + (b)
   (d) Waterline demarcation

4. **The diagnostic power of a test to correctly exclude the disease is reflected by:** *[AIIMS Nov 1993]*
   (a) Sensitivity
   (b) Specificity
   (c) Positive predictivity
   (d) Negative predictivity

5. **'Lead time' refers to the time between:** *[Karnataka 2011] [Recent Question 2013]*
   (a) Disease onset and first critical diagnosis
   (b) Disease onset and first possible point of detection
   (c) First possible point of detection and final critical point
   (d) First possible point of detection and usual time of diagnosis

6. **Screening for condition recommended when:**
   (a) Low case fatality rate *[Recent Question 2012]*
   (b) Diagnostic tools not available
   (c) No effective treatment available
   (d) Early diagnosis can change disease course because of effective treatment

7. **Screening is done because of all except:** *[Recent Question 2014]*
   (a) Testing for infection or disease in population or in individuals who are not seeking health care
   (b) It is defined presumptive identification of unrecognized disease
   (c) Search for unrecognized disease or defect by means of rapidly applied test, examinations or other procedures in apparently healthy individuals
   (d) Use of clinical or laboratory tests to detect disease in individual seeking health care for other reasons

8. **Which of the following are the characteristic features of screening tests?**
   1. Done on healthy people
   2. Done on unhealthy people
   3. More accurate
   4. Less accurate
   5. Less expensive
   6 More expensive
   7. Not a basis for treatment
   8. Used as a base for treatment

   Select the correct answer using the code given below *[UPSC CMS 2015]*
   (a) 2, 4, 5 and 8
   (b) 1, 3, 5 and 8
   (c) 2, 3, 6 and 7
   (d) 1, 4, 5 and 7

Review Questions

9. **Pap Smear is used for which of the following:**
   (a) Lung cancer *[Bihar 2004]*
   (b) Colon cancer
   (c) Cervical cancer
   (d) Pancreatic cancer

10. **Period between the possible time of detection and the actual time of diagnosis is:** *[MH 2008]*
    (a) Lead time
    (b) Screening time
    (c) Generation time
    (d) Serial interval

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TYPES OF SCREENING

11. Which of the following is an example of Prospective screening? *[AIIMS Nov 2001]*
(a) Cervical Pap smear in a 40 year old female
(b) Neonatal screening in a newborn for Hypothyroidism
(c) Screening of immigrants in a country
(d) Urine for sugar screening in a 40 year old male

12. In which of the following disease, screening procedure increases the overall survival maximum?
(a) Prostate cancer *[AIIMS May 2007, 08]*
(b) Lung cancer *[Recent Question 2013]*
(c) Colon cancer *[Bihar 2014]*
(d) Ovarian cancer

13. Most specific screening test for Vitamin D deficiency is:
(a) 7-dehydrocholesterol *[NUPGET 2013]*
(b) 1, 25 dihydroxy Vitamin D
(c) 25 hydroxy Vitamin D
(d) Serum calcium levels

14. Most reliable test for screening of diabetes mellitus:
(a) GTT *[Recent Question 2012]*
(b) Glycosylated hemoglobin
(c) Fasting blood sugar
(d) Urine for sugar

15. Screening of cervical cancer at PHC level is done by:
(a) History and clinical examination *[DNB June 2011]*
(b) Colposcopy
(c) CT scan
(d) PAP smear

16. Blood screening is not done for: *[Recent Question 2012]*
(a) HIV
(b) HBV
(c) EBV
(d) HCV

CRITERIA FOR SCREENING

17. Screening test has the following features *except*:
(a) Done on apparently healthy individuals
(b) It is less accurate *[Karnataka 2009]*
(c) Test results are arbitrary and final
(d) It can be used as a basis for treatment

18. For the calculation of positive predictive value of a screening test, the denominator is comprised of:
(a) True positives + False negatives *[AIPGME 99, 03]*
(b) False positives + True negatives *[MH 2007]*
(c) True positives + False positives
(d) True positives + True negatives

19. All comprise inherent properties of a screening test *except*: *[AIIMS June-Dec 1998]*
(a) Sensitivity
(b) Specificity
(c) Yield
(d) Predictive accuracy

20. Reliability of a test means: *[AIIMS Nov 2006]*
(a) It measures what it is supposed to measure
(b) It is able to correctly predict the presence of disease
(c) It is able to correctly exclude the possibility of disease
(d) It yields same reading/value when repeated under same conditions

21. Reliability of a screening test does not means:
(a) Reproducibility *[AIIMS Nov 2006]*
(b) Precision
(c) Repeatability
(d) Validity

22. True about the following is: *[AIPGME 1998]*

	MI present	MI absent
Positive ECG	300	100
Negative ECG	25	75

(a) Sensitivity is less than specificity
(b) Sensitivity is same as specificity
(c) PPV is more than NPV
(d) PPV is same as NPV

23. Positive predictive value is most affected by:
(a) Prevalence *[AIPGME 1999]*
(b) Sensitivity
(c) Specificity
(d) Relative risk

24. A diagnostic test for a particular disease has a sensitivity of 0.90 and a specificity of 0.90. A single test is applied to each subject in the population in which the diseases population is 10%. What is the probability that a person positive to this test, has the disease?
(a) 90% *[AIIMS Nov 05]*
(b) 81%
(c) 50%
(d) 91%

25. In a group of patients presenting to a hospital emergency with abdominal pain, 30% of patients have acute appendicitis. 70% of patients with appendicitis have a temperature greater than 37.5 degree Celsius and 40% of patients without appendicitis have a temperature greater than 37.5 degree Celsius. Considering these findings, which of the following statements is correct?
(a) The sensitivity of temperature greater than 37.5 degree Celsius as a marker for appendicitis is 21/49 *[AIIMS Nov 2004]*
(b) The specificity of temperature greater than 37.5 degree Celsius as a marker for appendicitis is 42/70
(c) The positive predictive value of temperature greater than 37.5 degree Celsius as a marker for appendicitis is 21/30

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(d) The specificity of the test will depend upon the prevalence of appendicitis in the population to which it is applied

26. Specificity of a screening test is the ability of a test to detect: *[AIIMS Nov 2006; AIPGME 2000]*
(a) True positives *[UP 2000, DPG 2011, WB 2005]*
(b) False positives *[AIIMS May 2009, RJ 2002]*
(c) False negatives
(d) True negatives

27. Diagnostic power of the test is reflected by:
(a) Sensitivity *[AIPGME 2005]*
(b) Specificity
(c) Predictive value
(d) Population attributable risk

28. If the Hemoccult test is negative for screening of colonic cancer, no further test is done. If the hemoccult test is positive the individual will have a second stool sample tested with the Hemoccult II test. If this second for blood, the individual will be referred for more extensive evaluation. The effect of net sensitivity and net specificity of this method of screening is: *[AIIMS May 2005]*
(a) Net sensitivity and net specificity are both increased
(b) Net sensitivity is decreased and net specificity is increased
(c) Net sensitivity is increased and net specificity is decreased
(d) Net sensitivity remains the same and net specificity is increased

29. A screening test is used in same way in two similar populations, but the proportion of false positive results among those who test positive in population A is lower than among those who test positive in population B. What is the likely explanation for this finding? *[AIIMS Nov 2008, AIIMS May 03; AIPGME 01]*
(a) The specificity of the test is lower in population A
(b) The prevalence of disease is lower in population A
(c) The prevalence of disease is higher in population A
(d) The specificity of the test is higher in population A

30. A test for hepatitis C is performed for 200 patients with biopsy-proven disease and 200 patients known to be free of the disease. The test shows positive results on 180 of the patients with the disease, and negative results on 150 of the patients without the disease. Among those tested, this test therefore: *[AIPGME 2002]*
(a) Has a positive predictive value of 90%
(b) Has a negative predictive value of 75%
(c) Has a sensitivity of 90%
(d) Has a specificity of 82.5%

31. Due to an effective prevention program, the prevalence of an infectious disease in a community has been reduced by 90%. A physician continues to use the same diagnostic test for the disease that she has always used. How have the test's characteristics changed?
(a) Its sensitivity has increased *[AIPGME 1992]*
(b) Its positive predictive value has increased
(c) Its negative predictive value has increased
(d) The test's characteristics have not changed

32. Validity of a test is based upon all *except*:
(a) Sensitivity *[AIIMS Nov 95]*
(b) Specificity *[Recent Question 2013]*
(c) Precision
(d) Accuracy

33. The probability of a test detecting a truly positive person from the population of diseased is the:
(a) Sensitivity of the test *[AIIMS Nov 98]*
(b) Specificity of the test
(c) Positive predictive value of the test
(d) Likelihood ratio

34. For the diagnosis of Deep Vein Thrombosis, 2 tests are done together, namely Impedance plethysmography and leg scanning after injecting 125I fibrinogen. This process will lead to: *[AIIMS Nov 2006]*
(a) Increasing the positive predictive value
(b) Increasing the negative predictive value
(c) Increasing the pretest odds
(d) Increasing the specificity

35. Blood pressure (BP) of Mr. Ram is 120/ 80 mm Hg. 4 different sphygmomanometries (I, II, III, IV) are used to measure his BP with 3 readings each. Based on their readings, match the sphygmomanometries with their respective accuracy and precision parameters:

Readings of sphygmomanometries			Parameters
I	120/ 80, 120/ 80, 120/ 80	A	Precise but Inaccurate
II	140/ 96, 108/62, 96/82	B	Imprecise but Accurate
III	140/ 96, 140/ 96, 140/ 96	C	Precise and Accurate
IV	122/ 82, 120/ 80, 118/ 78	D	Imprecise and Inaccurate

(a) A – II, B – IV, C – I, D – III *[DPG 2006]*
(b) A – III, B – II, C – IV, D – I
(c) A – IV, B – III, C – II, D – I
(d) A – III, B – IV, C – I, D – II

36. Which one of the following relationships shown between different parameters of a performance of a test is correct? *[AIIMS May 04]*
(a) Sensitivity = 1 – specificity
(b) Positive predictive value = 1 – negative predictive value
(c) Sensitivity is inversely proportional to specificity
(d) Sensitivity = 1 – positive predictive value

37. The usefulness of a 'screening test' in a community depends on its: *[AIPGME 2004]*
[AIIMS May 2003]
(a) Sensitivity
(b) Specificity
(c) Reliability
(d) Predictive value

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38. Study this formula carefully:

$$\frac{\text{True positives}}{\text{True positive} + \text{False negatives}} \times 100$$

This denotes: *[AIPGME 1996; 03]*

(a) Sensitivity
(b) Specificity
(c) Positive Predictive value
(d) Negative Predictive value

39. Sensitivity indicates: *[DPG 2008]*

(a) Positivity in disease
(b) Detection of positivity cases not in disease
(c) It identify correctly those who have not in disease
(d) It depends upon positive cases having disease and negative cases having disease

40. In a population of 10000 people, the prevalence of a disease is 20%. The sensitivity of a screening test is 95% and specificity is 80%. The positive predictive value of the test will be: *[AIIMS Nov 2009]* *[Recent Question 2015]*

(a) 54.3%
(b) 45.7%
(c) 15.3%
(d) 98.5%

41. True about reliability of a test: *[AIIMS Nov 2009]*

(a) Gives same results on repeated tests
(b) Investigator's knowledge is important
(c) Consistency and reproducibility of the test are not a problem
(d) Extent of variation of measurement of contained behaviour

42. A test has high false positive rate in a community. True is: *[AIIMS May 2010]*

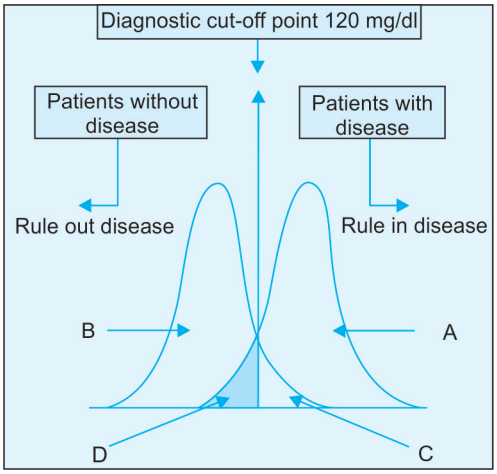
(a) High prevalence *[DNB 2011, WB 2008]*
(b) Low prevalence
(c) High sensitivity
(d) High specificity

43. A doctor order 6 tests for SLE. Which of the following is needed for inference? *[AIIMS May 2010]*

(a) Prior probability of SLE, sensitivity and specificity of test
(b) Incidence of SLE and predictivity of each test
(c) Incidence and prevalence of SLE
(d) Relative risk of SLE in the patient

44. A graph showing curves of Normal blood sugar level and Diabetic blood sugar level is shown below. Some area is found over-lapping in the two curves. Diagnostic cut-off point of 120 mg/dl is also marked. What does the shaded area (D) represent in the graph?

(a) True positive *[AIPGMEE 2011]*
(b) True negative
(c) False positive
(d) False negative



45. You have clinically diagnosed a patient as having SLE and ordered 6 tests, out of which 4 have come positive and 2 have come negative. To know the probability of SLE at this point, you need to know: *[AIIMS November 2011] [AIPGME 2012]*

(a) Incidence of SLE and Predictive value of each test
(b) Incidence and prevalence of SLE
(c) Relative risk of SLE in this patient
(d) Prior probability of each test, Sensitivity and specificity of each test

46. A new method of measuring Haemoglobin levels has been developed. Ten successive readings of a single sample are as follows: 9.4, 10.4, 9.6, 9.1, 10.8, 12.1, 10.1, 9.8, 9.2, 9.5. But the Haemoglobin measured by standard calorimetry was 10.2. Therefore the given method has: *[AIIMS November 2011]*

(a) Low validity, low reliability
(b) Low validity, high reliability
(c) High validity, low reliability
(d) High validity, high reliability

47. If the prevalence of a disease in a population increases, the predictive value of a positive test:

(a) Increases *[Karnataka 2011]*
(b) Decreases *[Recent Question 2013]*
(c) Remains constant
(d) Becomes compromised

48. Which of the following is/are true about a screening test? *[PGI November 2012]*

(a) Sensitivity is 1 – False positive rate
(b) Specificity is 1 – False negative rate
(c) Post-test probability is Pre-test probability multiplied by Prevalence
(d) Predictive value does not depend on prevalence
(e) None of the above

49. A city has a population of 10000 with 500 diabetic patients. A new diagnostic test gives true positive result in 350 patients and false positive result in 1900 patients. Which of the following is/ are true regarding the test?

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(a) Prevalence is 5% *[PGI May 2013]*
(b) Sensitivity is 70%
(c) Specificity is 80%
(d) Sensitivity is 80%
(e) Specificity is 70%

50. The formula A/A+B in the following table denotes?

Test result	Persons with disease	Persons without disease	Total
Positive	A	B	A + B
Negative	C	D	C + D

(a) Specificity *[DPG 2008]*
(b) Sensitivity
(c) PPV
(d) NPV

51. Sensitivity is: *[DNB 2000, 2006, 2007]*
(a) True positive/True positive + false negative
(b) True positive/False positive + true negative
(c) True negative/False negative + false positive
(d) True negative/False negative + true positive

52. The ability of a test to correctly diagnose the percentage of sick people who are having the condition is called as:
(a) Sensitivity *[DNB December 2009]*
(b) Specificity
(c) Positive predictive value
(d) Negative predictive value

53. Most important factor for a test to be a good screening test is: *[DNB December 2011]*
(a) Specificity
(b) Sensitivity
(c) Reliability
(d) Predictive value

54. If prevalence is increased, which of the following will be seen? *[PGI November 2013]*
(a) Sensitivity increase
(b) Specificity decrease
(c) Increase positive predictive value
(d) Decrease positive predictive value
(e) None of the above

55. Positive predictive value is a function of sensitivity, specificity and …….. *[AIIMS May 2014]*
(a) Incidence
(b) Prevalence
(c) Negative predictive value
(d) Accuracy

56. True statement about PPV is *[Recent Question 2014]*
(a) It increases with prevalence
(b) It decreases with prevalence
(c) No relation with prevalence
(d) Doubles with decrease in prevalence

57. 5000 persons underwent screening for a disease. Out of 500 diseased, 350 reported True positive and out of 4500 healthy, 3000 reported True negative. Which of the following is correct about this screening test?
(a) Sensitivity 70% *[Recent Question 2014]*
(b) Specificity 70%
(c) Sensitivity 80%
(d) Specificity 80%

58. A diagnostic test for a particular disease has a sensitivity of 0.90 and a specificity of 0.80. A single test is applied to each subject in the population in which the diseased population is 30%. What is the probability that a person, negative to this test, has no disease?
(a) Less than 50% *[Recent Question 2014]*
(b) 70
(c) 95%
(d) 72%

59. Denominator in Negative predictive value is *[Recent Question 2015]*
(a) TP + FP
(b) TP + FN
(c) TN + FN
(d) TN + FP

60. True negatives in a screening test is *[Recent Question 2015]*
(a) d/c+d
(b) d/b+d
(c) a/a+b
(d) a/a+c

61. Recently a new Latex Agglutination Test was approved for Screening of a disease. Calculate Sensitivity and Specificity based on the findings given below *[AIIMS November 2015]*

	Test positive	Test negative
Diseased	27	3
Non-diseased	5	95

(a) Sensitivity 90%, Specificity 90%
(b) Sensitivity 95%, Specificity 90%
(c) Sensitivity 90%, Specificity 95%
(d) Sensitivity 95%, Specificity 95%

Review Question

62. Usefulness is: *[DNB 2006]*
(a) True positive/True positive + false negative
(b) True positive/False positive + true negative
(c) True negative/True negative + false positive
(d) True negative/False negative + true positive

63. False negative means: *[Bihar 2006]*
(a) Persons have disease but show negative test result
(b) Persons have not disease but show negative test result

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(c) Persons have disease but show positive test result
(d) Persons have not disease but show positive test result

64. A screening test is more sensitive: *[UP 2005]*
(a) Few false positive *[RJ 2007]*
(b) Few false negative
(c) More false positive
(d) More false negative

65. High false positive cases in a community signify that disease has: *[AI 2001; UP 2008]*
(a) High prevalence and Low incidence
(b) High incidence and Low prevalence
(c) Low prevalence and Low incidence
(d) High Incidence and High prevalence

66. Positive predictive value of a test does not depends upon:
(a) Sensitivity *[MP 2001]*
(b) Specificity
(c) Prevalence of disease
(d) Incidence of disease

67. Sensitivity numerator is: *[MP 2001]*
(a) False positives *[AIIMS May 2015]*
(b) False negatives *[AIIMS November 2015]*
(c) True negatives
(d) True positives

68. A screening test was positive in 50% of diseased and 10% of healthy population What is the specificity of the test? *[MP 2006]*
(a) 0.5
(b) 0.9
(c) 0.83
(d) 0.064

69. True positive cases are detected by: *[MH 2000]*
(a) Specificity *[RJ 2006]*
(b) Sensitivity
(c) Positive predictive value
(d) Negative predictive value

MISCELLANEOUS

70. Screening in general population done in cancers of:
(a) Breast *[PGI Dec 02]*
(b) Colon
(c) Cervix
(d) Ovarian
(e) Pancreatic

71. Not a part of National Screening Programmes?
(a) Diabetes mellitus *[AIPGME 2011]*
(b) Carcinoma cervix
(c) Refractive errors
(d) Dental caries

72. Which of the following is not useful as a screening method? *[AIIMS PGMEE November 2013]*
(a) Pap smear for Cervical cancer
(b) CA-125 for Ovarian cancer
(c) Office endometrial washing for Endometrial cancer
(d) USG in Endometrial cancer

73. Screening test for Breast and Genital tract malignancy is: *[AIIMS November 2014]*
(a) CA- 125
(b) Mammography
(c) Office endometrial aspiration
(d) Pap smear

74. Best time to screen in Breast self examination (BSE) technique is *[Recent Question 2014]*
(a) 1 week before the menstruation
(b) 1 week after the menstruation
(c) During ovulation
(d) 2-3 days post-ovulation

75. Screening is not useful for *[AIIMS PG May 2015]*
(a) Carcinoma colon
(b) Breast carcinoma
(c) Prostate carcinoma
(d) Testicular carcinoma

Review Questions

76. Epidemiological survey of 'at risk' is called:
(a) Survey *[UP 2003]*
(b) Screening
(c) Surveillance
(d) Rehabilitation

77. The method of choice of tuberculosis detection mass screening is: *[TN 2003]*
(a) Tuberculin test
(b) Mass Miniature Radiography (MMR)
(c) Sputum smear examination by direct microscopy
(d) Sputum culture

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EXPLANATIONS

CONCEPTS IN SCREENING

1. Ans. (c) B and C *[Ref. Park 23/e p135-136]*

- Screening programmes are most useful if it can be applied before a final critical point in a disease (i.e. point after which attempted treatment of disease may not yield desirable beneficial effects); but they cannot detect a disease before B (Point of first possible detection)
- Thus a screening test is most useful if applied between B (Point of first possible detection) and C (Final critical point)
- It is of no use if applied after a final critical point.

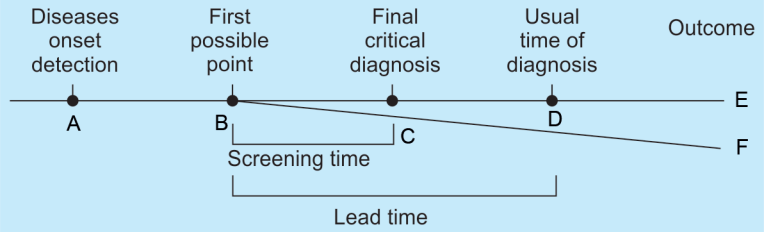

Figure: Model for early detection programmes

- B – C: Screening time
- B – D: Lead Time
  - * *Lead time is the advantage gained by screening* (leading the time of diagnosis): Early detection of disease (B rather than D) will ensure earlier institution of treatment, thus better prognosis

2. Ans. (b) Secondary *[Ref. Park 23/e p135]*

3. Ans. (b) Hidden portion of the iceberg *[Ref. Park 23/e p135]*

- *Differences in portions of iceberg phenomenon of disease:*

	Tip of iceberg	Submerged part of iceberg
Composition	Clinical cases	Latent, inapparent, presymptomatic, undiagnosed and undiagnosed cases and carriers
Visibility to clinician	Visible	Invisible
Prime importance for	Clinician	Epidemiologist
Detection	Diagnostic tests	Screening tests
Useful level of prevention	Secondary	Secondary

- *Iceberg phenomenon of a disease is not shown by:*
  - Rabies
  - Tetanus
  - Measles
  - Rubella
- *Iceberg phenomenon of a disease is also known as: Biological spectrum of a disease*

4. Ans. (d) Negative predictivity *[Ref. Park 23/e p139]*

- *Negative predictive value [NPV]:* Ability of a screening test to identify correctly all those who do not have the disease, out of all those who test negative on a screening test

$$NPV = \frac{d}{c+d} \times 100 = \frac{TN}{TN+FN} \times 100$$

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Also Remember

- *'Usefulness of a screening test'* is given by: Sensitivity
- *Statistical index of diagnostic accuracy:* Sensitivity
- *Diagnostic power of a screening test:* Predictive accuracy
  - *Diagnostic power of a screening test to correctly identify a disease:* Positive predictive value (PPV)
  - *Diagnostic power of a screening test to correctly exclude a disease:* Negative predictive value (NPV)
- Predictive value of a screening test depends on:
  - Sensitivity
  - Specificity
  - Prevalence of disease in the population
- *A test with a high specificity has a low Type I error rate*
- False positive rate (α) = 1 – specificity
- False negative rate (β) = 1 – sensitivity
- Power of a test (sensitivity) = 1 – β
- Receiver operating characteristic (ROC) curve, is a graphical plot between:
  - sensitivity and (1 – specificity) OR
  - true positive rate and false positive rate
- *Efficiency of a Screening Test [E]:* the percentage of the times that the test give the correct answer compared to the total number of tests

$$E = \frac{TP + TN}{TP + TN + FP + FN} \times 100 = \frac{a + d}{a + b + c + d} \times 100$$

- *Youden's J statistic [Youden's index]:* Is a single statistic that captures the performance of a test
  Y = Sensitivity + Specificity - 1

5. **Ans. (d) First possible point of detection and usual time of diagnosis** *[Ref. Park 23/e p135-136]*
6. **Ans. (d) Early diagnosis can change disease course because of effective treatment** *[Ref. K. Park 23/e p135]*
7. **Ans. (a) Testing for infection or disease in population or in individuals who are not seeking health care** *[Park 23/e p135-136]*
8. **Ans. (d) 1, 4, 5 and 7** *[Ref. Park 23/e p135]*

Review Questions

9. **Ans. (c) Cervical cancer** *[Ref. Park 23/e p387]*
10. **Ans. (a) Lead time** *[Ref. Park 23/e p135-136]*

TYPES OF SCREENING

11. **Ans. (c) Screening of immigrants in a country** *[Ref. Park 23/e p136]*
    - *Screening of disease:* Is used to search for an unrecognized diseases or defect, in apparently healthy individuals, by means of rapidly applied tests, examinations or other procedures
    - *Types of screening:*

	Prescriptive screening	Prospective screening
Definition	People screened for own's benefit	People screened for other's benefit
Essential purpose	Case detection	Essential purpose
Request for screening	No specific request	Case detection
Example[s]	Neonatal screening	Disease control
	Pap smear	Specific request from authority
	Urine for sugar	Screening of immigrants

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Also Remember

NEONATAL SCREENING (NNS):
- NNS is primarily a Secondary Level of Prevention
- *Neonatal hypothyroidism [NNH]:*
  - *Most common neonatal disorder to be screened is Neonatal hypothyroidism [NNH]*
  - *Blood sample of choice:* Umbilical cord blood
  - *Detection of:* TSH, T4
- *Phenylketonuria [PKU]:*
  - *PKU is an autosomal recessive trait* with a frequency of 1 in 10,000 births
  - *Enzyme deficient in PKU:* Phenylalanine hydroxylase
  - *Treatment of PKU:* restricting or eliminating foods high in phenylalanine, such as breast milk, meat, chicken, fish, nuts, cheese, legumes and other dairy products
  - *Guthrie Test:* Is done in neonates for mass screening of Phenylketonuria (PKU)
    1. *Guthrie test was the first screening test used in neonates*
    2. *Blood sample* is collected by heel prick of the baby 7 –10 days after birth
    3. *Guthrie Test is negative* in first 0 – 3 days of life
    4. *Guthrie test can detect* PKU, Galactosemia and Maple syrup urine disease
    5. *Chemicals detected*: Phenylalanine, Phenylpyruvate and Phenyllactate
    6. *It is a semi-quantitative test*
  - Currently, Guthrie test has been replaced by *Tandem mass Spectrometry* (TMS)

12. Ans. (c) Colon cancer *[Ref. CMDT 2014 p1571]*
- *Colorectal cancer is ideal for screening:* as it is a common disease affecting 6% of men and women, which is fatal in half of the cases, yet it is curable if detected at an early satge

13. Ans. (c) 25 hydroxy Vitamin D *[Ref. Clinical Laboratory Medicine by McClatchey, 2/e p446]*

14. Ans. (c) Fasting blood sugar *[Ref. K. Park 23/e p395]*

15. Ans. None [Now by via test] *[Ref. Guidelines for screening of cervical cancer 2006]*

16. Ans. (c) EBV *[Ref. Transfusion Guidelines for Clinicians by K Bhardwaj, 1/e p110]*

CRITERIA FOR SCREENING

17. Ans. (d) It can be used as a basis for treatment *[Ref. Park 23/e p135]*

18. Ans. (c) True positives + False positives *[Ref. Park 23/e p139]*
- *Evaluation of screening test:*

Criteria	Numerator	Denominator
Sensitivity	True positives (a)	True positives + False negatives (a + c)
Specificity	True negatives (d)	True negatives + False positives (b + (d)
PPV	True positives (a)	True positives + False positives (a + b)
NPV	True negatives (d)	True negatives + False negatives (c + d)
% False positives	False positives (b)	True negatives + False positives (b + (d)
% False negatives	False negatives (c)	True positives + False negatives (a + c)

- *Positive predictive value [PPV]:* Ability of a screening test to identify correctly all those who have the disease, out of all those who test positive on a screening test
  - *PPV of a screening test depends on:*
    1. Sensitivity
    2. Specificity
    3. Prevalence of disease in the population
  - PPV of a screening test is directly proportional to prevalence of disease in the population
    PPV a Prevalence of disease
- As the prevalence of a disease increases in a population, PPV increases for the screening test

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Also Remember

- PPV is also known as *'post-test probability of a disease'* or *'precision rate'*
- *Baye's Theorem:* Gives relationship between PPV of a screening test and Sensitivity, Specificity and Prevalence of disease in a population
- NPV is inversely proportional to Prevalence of disease in a population

$$PPV = \frac{[Sensitivity \times Prevalence]}{[Sensitivity \times Prevalence] + [(1 - Specificity)(1 - Prevalence)]} \times 100$$

19. Ans. (c) Yield *[Ref. Park 23/e p140]*

- *Yield of the screening test:* Is the amount of previously unrecognized disease that is diagnosed as result of screening effort
- *Yield of the screening test depends on:*
  - Sensitivity of screening test
  - Specificity of screening test
  - Prevalence of the disease in population
  - Participation of individuals in the detection programme
- *Yield of a screening test increases by: selecting high risk population for screening*

20. Ans. (d) It yields same reading/ value when repeated under same conditions *[Ref. Park 23/e p137-138]*

- Reliability of a test: Test gives consistent results when repeated more than once on the same individual or material, under the same conditions
- *Reliability is also known as:* Repeatability, Precision or Reproducibility
- *Reliability is measured by:*
  - Pearson product-moment correlation coefficient
  - Cronbach's alpha (internal consistency)
- *Reliability of a test depends on:*
  - *Observer variation:*
    1. Intra-observer variation: Same observer taking 2 or more readings give varied results
    2. Inter-observer variation: Variation between different observers on same subject/ material
  - *Biological [subject] variation:* occur due to
    1. Changes in parameters observed
    2. Variation in perceptions and answers of patients
    3. Regression to the mean
  - *Errors relating to technical methods:* occur due to
    1. Defective instruments
    2. Erroneous calibrations
    3. Faulty reagents
    4. Inappropriate/ unreliable test

Also Remember

- *Intra-observer variation can be minimized by:* taking average of readings
- *Inter-observer variation can be minimized by:*
  - standardization of procedures/ classifications
  - intensive training of all observers
  - making use of 2 or more observers for independent assessment
- *Accuracy:* degree of closeness of a measured or calculated quantity to its actual (true) value

$$Accuracy = \frac{TP + TN}{TP + FP + FN + TN}$$

- *Precision:* the degree to which further measurements or calculations show the same or similar results
  - *Reliability is precision, while validity is accuracy*
- Reliability is inversely related to random error

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21. Ans. (d) Validity *[Ref. Park 23/e p138]*

- *Validity:* Refers to what extent the test measures which it purports to measure (adequacy of measurement)
- *Validity has 2 components:*
  - Sensitivity
  - Specificity
- *Types of Validity:*
  - *Conclusion validity:* Defines if there is a relationship between 2 variables
  - *Internal validity:* Assuming relationship between 2 variables, defines if it is causal
    1. Is free of bias
    2. Valid conclusions can be drawn for individuals in a sample
  - Construct validity: Assuming causal relationship between 2 variables, defines if our theory is best to our constructs
  - *External validity:* Assuming causal relationship between 2 variables, defines if our theory can be generalized to the broader population
  - *Concurrent validity:* refers to the degree of correlation with other measures of the same construct measured at the same time
  - *Face [Logical] validity:* Relevance of a measurement appear obvious
  - *Content validity:* Measurement of all variable components
  - *Consensual validity:* If no. of experts agree to a parameter
  - *Criterion validity:* If compared with a reference or gold standard
    1. Is best measure of validity
    2. Usually expressed as sensitivity and specificity
  - Discriminant validity: If not showing strong correlation between 2 variables

22. Ans. (d) PPV is same as NPV *[Ref. Park 23/e p139, 140]*

Criteria	MI present	MI absent
Positive ECG	300 (TP (a)	100 (FP (b)
Negative ECG	25 (FN (c)	75 (TN (d)

- Sensitivity $= \frac{a}{a+c} \times 100 = \frac{TP}{TP+FN} \times 100$
  - Sensitivity $= \frac{300}{300+25} \times 100 = 92\%$
- Specificity $= \frac{d}{b+d} \times 100 = \frac{TN}{TN+FP} \times 10$
  - Specificity: $\frac{75}{75+100} \times 100 = 43\%$
- Positive predictive value (PPV) $= \frac{a}{a+b} \times 100 = \frac{TP}{TP+FP} \times 100$
  - PPV $= \frac{300}{300+100} \times 100 = 75\%$
- Negative predictive value (NPV) $= \frac{d}{c+d} \times 100 = \frac{TN}{FN+TN} \times 100$
  - NPV $= \frac{75}{25+75} \times 100 = 75\%$

Therefore,

- Sensitivity > PPV OR NPV > Specificity
- PPV = NPV

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23. Ans. (a) Prevalence *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p58]*

- *Baye's Theorem:* Gives relationship between PPV of a screening test and Sensitivity, Specificity and Prevalence of disease in a population

$$PPV = \frac{[Sensitivity \times Prevalence]}{[Sensitivity \times Prevalence] + [(1 - Specificity)(1 - Prevalence)]} \times 100$$

- Actual *Baye's Theorem:* Gives relationship between Post-test probability of a disease in a population (PTP = PPV) and Sensitivity, Specificity and Post-test probability of a disease in a population (pTP = Prevalence)

$$PTP = \frac{Sensitivity \times pTP}{[Sensitivity \times pTP] + [(1 - Specificity)(1 - pTP)]} \times 100$$

  - Post-test probability of a disease in a population (PTP) IS SAME AS PPV
  - Pre-test probability of a disease in a population (pTP) IS SAME AS Prevalence

Also Remember

- NPV is inversely proportional to Prevalence of disease in a population

$$NPV = \frac{Specificity \times (1 - Prevalence)}{[Specificity \times (1 - Prevalence)] + [(1 - Sensitivity) \times Prevalence]} \times 100$$

24. Ans. (c) 50% *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p58]*

In the given question,
Sensitivity = 0.90 = 90%
Specificity = 0.90 = 90%
Prevalence = 10%
Thus,

$$PPV = \frac{90 \times 10}{[90 \times 10] + [(100 - 90)(100 - 10)]} \times 100 = 50\%(0.50) = 50\%\ (0.50)$$

- **Alternate way of solving such questions:** Construct a hypothetical table of screening test (FOLLOW RULES: Disease on top of table, screening test results on left side of table). Always take round values (for e.g. 100, 1000, etc as total population)

Results of a screening test for a disease		Disease	
		Present	Absent
Results	Positive	a (TP)	b (FP)
	Negative	c (FN)	d (TN)
	Total	a + b	b + d

Now taking hypothetically, a + b + c + d (total population) = 1000,
Prevalence = 10% (given in question); No. of cases (a + (c) = 100
Thus, No of healthy population (b + (d) = Total population – cases = 1000 – 100 = 900

Since sensitivity $\left(\frac{a}{a+c} \times 100\right)$ = 0.90% = 90%; a = 90 and c = 10

Similarly, specificity $\left(\frac{d}{b+d} \times 100\right)$ = 0.90% = 90%; *d* = 810 and *b* = 90

Thus table will be as follows,

Results of a screening test for a disease		Disease	
		Present	Absent
Results	Positive	90	90
	Negative	10	810
	Total	100	900

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Now, $PPV = \frac{a}{a+b} \times 100 = \frac{90}{90+90} \times 100 = 50\%\ (0.50)$

Also Remember

- *Negative predictive value [NPV]:*

$$NPV = \frac{[Specificity \times (100 - Prevalence)]}{[Specificity \times (100 - Prevalence)] + [(100 - Sensitivity) \times Prevalence]} \times 100$$

25. Ans. (b) The specificity of temperature greater than 37.5 degree Celsius as a marker for appendicitis is 42/70

[Ref. Park 23/e p139-140]

- **In the given question,** disease is Acute appendicitis and screening test is temperature (Positive if = 37.5° C)
- Taking a hypothetical total population (a + b + c + d) = 100, Prevalence of Acute appendicitis = 30%;
  cases (a + c) = 30
  Healthy population (without acute appendicitis; b + d) = 100 – 30 = 70
  a = TP = 70% of (a + c) = 21
  b = FP = 40% of (b + d) = 28
  c = FN = 30% of (a + c) = 9
  d = TN = 60% of (b + d) = 42

Therefore,

- Sensitivity = $\frac{a}{a+c} \times 100 = \frac{21}{30} \times 100$
- Specificity = $\frac{d}{b+d} \times 100 = \frac{42}{70} \times 100$
- Positive predictive value (PPV) = $\frac{a}{a+b} \times 100 = \frac{21}{49} \times 100$
- Negative predictive value (NPV) = $\frac{d}{c+d} \times 100 = \frac{42}{51} \times 100$

26. Ans. (d) True negatives *[Ref. K. Park 23/e p139]*

- *Specificity of a screening test is the ability of a test to detect:* True negatives
- *Sensitivity of a screening test is the ability of a test to detect:* True positives
- *'Usefulness of a screening test' is given by:* Sensitivity
- *Statistical index of diagnostic accuracy:* Sensitivity

Also Remember

- *Out of those disease in a population, few are correctly picked as positive by a screening test, this is:* Sensitivity of a screening test
  - Sensitivity = $\frac{a}{a+c} \times 100$
- *Out of those healthy in a population, few are correctly picked as not having the disease by a screening test, this is:* Specificity of a screening test
  - Specificity = $\frac{d}{b+d} \times 100$
- *Out of those shown positive by a screening test in a population, those who actually have the disease, this is:* PPV of a screening test
  - Positive predictive value (PPV) = $\frac{a}{a+b} \times 100$
- *Out of those shown negative by a screening test in a population, those who actually don't have the disease, this is:* NPV of a screening test
- Negative predictive value (NPV) = $\frac{d}{c+d} \times 100$

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27. Ans. (c) Predictive value *[Ref. Park 23/e p140]*

- *Diagnostic power of a screening test:* Predictive accuracy (it tells the actual no. of people having the disease or not having the disease out of those shown positive or negative by a screening test, respectively)
  - *Diagnostic power of a screening test to correctly identify a disease:* Positive predictive value (PPV)
  - *Diagnostic power of a screening test to correctly exclude a disease:* Negative predictive value (NPV)

28. Ans. (b) Net sensitivity is decreased and net specificity is increased *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p56]*

SCREENING TESTS USED IN SERIES: A population is subjected to one screening test followed by a second screening test; 2nd screening test is applied on those individuals only who test positive on the 1st screening test

- *Combined sensitivity of 2 tests A and B in series:* Sensitivity (A) X Sensitivity (B)
- *Combined specificity of 2 tests A and B in series:* Specificity (A) + Specificity (B) – [Specificity (A) × Specificity (B)]

SCREENING TESTS USED IN PARALLEL: A population is subjected to two (or more) screening tests at the same time; each of the individuals is subjected to both (or all) screening tests

- *Combined sensitivity of 2 tests A and B in parallel:* Sensitivity (A) + Sensitivity (B) – [Sensitivity (A) × Sensitivity (B)]
- *Combined specificity of 2 tests A and B in parallel:* Specificity (A) X Specificity (B)

	Tests in series	Tests in parallel
Combined sensitivity	Decreases	Increases
Combined specificity	Increases	Decreases
Combined PPV	Increases	Decreasee
Combined NPV	Decreases	Increases

29. Ans. (c) The prevalence of disease is higher in population A *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p 58]*

Results of a screening test for a disease		Disease	
		Present	Absent
Results	**Positive**	a (TP)	b (FP)
	Negative	c (FN)	d (TN)

- *Total population having the disease [cases]:* 'a + c' (TP + FN)
- *Total population not having the disease [healthy]:* 'b + d' (FP + TN)
- *Total population:* a + b + c + d = TP + FP + FN + TN

  PPV depends on sensitivity, specificity and prevalence of disease in the population

Now in this question, a screening test is used in same way in two similar populations; thereby the screening test will have similar sensitivity and specificity in both populations

PPV = a/ (a + (b) X 100, thus b (False Positive rate) is inversely proportional to PPV; and PPV is directly proportional to Prevalence of disease in a population,

So, False Positive rate (FP rate) is inversely proportional to the prevalence of disease in the population

Therefore, if the same screening test is having lower FP rate in population A (as compared to a similar population B), then this could be explained by higher prevalence of disease in population A

Also,

Prevalence of disease: $\frac{\text{Cases}}{\text{Total population}} \times 100 = \frac{a+c}{a+b+c+d} \times 100$

Therefore, as b (FP rate) is lower in population A, prevalence of disease will be higher in this population

30. Ans. (c) Has a sensitivity of 90% *[Ref. Park 23/e p139]*

Now as given in the question, a + c (cases) = 200; b + d (healthy) = 200

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Also, test shows positive results on 180 of the patients with the disease (200), so a (TP) = 180 and c (FN) = 20; and negative results on 150 of the patients without the disease, so d (TN) = 150 and b (FP) = 50

Results of a screening test for a disease		Hepatitis C	
		Present	Absent
Results	Positive	180	50
	Negative	20	150
	Total	200	200

- Sensitivity $= \frac{a}{a+c} \times 100 = \frac{TP}{TP+FN} \times 100$
  - Sensitivity $= \frac{180}{180+20} \times 100 = 90\%$
- Specificity $= \frac{d}{b+d} \times 100 = \frac{TN}{TN+FP} \times 100$
  - Specificity: $\frac{150}{150+50} \times 100 = 75\%$
- Positive predictive value (PPV) $= \frac{a}{a+b} \times 100 = \frac{TP}{TP+FP} \times 100$
  - PPV $= \frac{180}{180+50} \times 100 = 78\%$
- Negative predictive value (NPV) $= \frac{d}{c+d} \times 100 = \frac{TN}{FN+TN} \times 100$
  - NPV $= \frac{150}{20+150} \times 100 = 88\%$

31. Ans. (c) Its negative predictive value has increased *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p58]*

- *PPV and NPV of a screening test depends on:*
  - Sensitivity
  - Specificity
  - Prevalence of disease in the population

In this question, since a physician continues to use the same diagnostic test for the disease that she has always used, sensitivity and specificity of the test will remain same

But predictive value of a test (PPV and NPV) depends on prevalence of a disease in a population

- *PPV is directly proportional to prevalence of disease in the population*
  - PPV á Prevalence of disease
  - As the prevalence of a disease increases in a population, PPV increases for the screening test
- *NPV is inversely proportional to Prevalence of disease in a population*
  - NPV α 1/ Prevalence of disease
  - As the prevalence of a disease increases in a population, NPV decreases for the screening test

Therefore, since the prevalence of an infectious disease in a community has been reduced by 90%, its PPV will reduce and its NPV will increase

32. Ans. (c) Precision *[Ref. Park 23/e p138-139]*

- *Validity:* Refers to what extent the test measures which it purports to measure (adequacy/accuracy of measurement)
- *Validity has 2 components:*
  - Sensitivity
  - Specificity
- *Inherent properties of a screening test:*
  - Sensitivity
  - Specificity
  - Predictive accuracy

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Also Remember

- *Accuracy:* degree of closeness of a measured or calculated quantity to its actual (true) value
- *Accuracy* = [(sensitivity) (prevalence)] + [(specificity) (1 – prevalence)]
- *Efficiency/ Accuracy of a Screening Test [E]:* the percentage of the times that the test give the correct answer compared to the total number of tests

$$E = \frac{TP + TN}{TP + TN + FP + FN} \times 100 = \frac{a + b}{a + b + c + d} \times 100$$

- *Precision:* the degree to which further measurements or calculations show the same or similar results
  - *Precision is also known as:* Reliability, Repeatability, Consistency or Reproducibility
- *Precision versus Accuracy:*

	Precision	Accuracy
Definition	Repeatability, reliability, consistency, reproducibility of a test	Degree of closeness of a measured or calculated quantity to its actual (true) value
Test[s]	Range chart R – chart	Mean chart Levy Jennings (LJ) chart Shewhart control chart

- Reliability is precision, while validity is accuracy
- PPV is also known as 'post-test probability of a disease' or 'precision rate'
- Levy Jennings (LJ) chart is a 'test of accuracy and test of loss of precision'

33. Ans. (a) Sensitivity of the test *[Ref. Park 23/e p139]*

- *Sensitivity of a screening test detects:* true positives among all diseased
- *Specificity of a screening test detects:* true negatives among all healthy
- *PPV detects:* true positives among all those who are positive on a screening test
- *NPV detects:* true negatives among all those who are negative on a screening test

Also Remember

- *Likelihood ratio:* Incorporates both the sensitivity and specificity of the test and provides a direct estimate of how much a test result will change the odds of having a disease
  - *Likelihood ratio for a positive result [LR^+]* tells you how much the odds of the disease increase when a test is positive

$$LR^+ = \frac{\text{Sensitivity}}{1 - \text{Specificity}}$$

- *Likelihood ratio for a negative result [LR^-]* tells you how much the odds of the disease decrease when a test is negative

$$LR^- = \frac{1 - \text{Sensitivity}}{\text{Specificity}}$$

- *Post-test odds [the chances that patient has a disease]:* Once you have specified the pre-test odds (the likelihood that the patient would have a specific disease prior to testing), you multiply them by the likelihood ratio
  $Odds_{post} = Odds_{pre} \times$ Likelihood ratio

34. Ans. (b) Increasing the negative predictive value *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p56]*
In the given question, 2 tests - Impedance Plethysmography and leg scanning after injecting 125I fibrinogen are done together, for the diagnosis of Deep Vein Thrombosis. Therefore these are two tests in done in parallel

35. Ans. (d) A – III, B – IV, C – I, D – II *[Ref. A Dictionary of Public Health by J Kishore, p5, 410]*

- *Accuracy:* degree of closeness of a measured or calculated quantity to its actual (true) value
- *Precision:* the degree to which further measurements or calculations show the same or similar results
  - Precision is also known as: Reliability, Repeatability, Consistency or Reproducibility
- *Accuracy* = [(sensitivity) (prevalence)] + [(specificity) (1 – prevalence)]
- *Accuracy* = $\frac{TP + TN}{TP + FP + FN + TN}$
- *Reliability is precision, while validity is accuracy*

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36. Ans. (c) Sensitivity is inversely proportional to specificity *[Ref. Park 23/e p139]*

FEW IMPORTANT RELATIONSHIPS IN SCREENING:

- Sensitivity is inversely proportional to specificity
- False positive rate (α) = 1 – specificity
- False negative rate (β) = 1 – sensitivity
- Power of a test (sensitivity) = 1 – β = 1 - False negative rate
- *Youden's J statistic [Youden's index]*: Is a single statistic that captures the performance of a test
  Y = Sensitivity + Specificity - 1
- *Predictive value and Prevalence of the disease:*
  - PPV is directly proportional to Prevalence of disease in a population
  - NPV is inversely proportional to Prevalence of disease in a population
- Reliability is inversely related to random error
- *Likelihood ratio:*
  - *Likelihood ratio for a positive result [LR+]*

$$LR^{+} = \frac{\text{Sensitivity}}{1 - \text{Specificity}}$$

  - Likelihood ratio for a negative result [LR-]

$$LR^{-} = \frac{1 - \text{Sensitivity}}{\text{Specificity}}$$

  - *Post-test odds [the chances that patient has a disease]:*

$$\text{Odds}_{post} = \text{Odds}_{pre} \times \text{Likelihood ratio}$$

37. Ans. (a) Sensitivity *[Ref. Epidemiology, Biostatistics and Preventive Medicine by James Jekel, p120]*

38. Ans. (a) Sensitivity *[Ref. Park 23/e p139]*

39. Ans. (a) Positivity in disease; (d) It depends upon positive cases having disease and negative cases having disease *[Ref. Park 23/e p139]*

40. Ans. (a) 54.3% *[Ref. Park 23/e p139]*

In the given question,

Sensitivity = 95%

Specificity = 80%

Prevalence = 20%

Thus,

$$PPV = \frac{[95 \times 20]}{[95 \times 20] + [(100 - 80)(100 - 20)]} \times 100 = 54.3\%$$

41. Ans. (a) Gives same results on repeated tests *[Ref. Park 23/e p137-138]*

RELIABILITY OF A TEST

- Gives same results on repeated tests: Reliability
- Investigator's knowledge is important
- Consistency and reproducibility of the test are not a problem
- Extent of variation of measurement of contained behaviour

42. Ans. (c) High sensitivity *[Ref. K. Park 23/e p139]*

Results of a screening test for a disease		**Disease**	
		Present	**Absent**
Results	**Positive**	a (TP)	b (FP)
	Negative	c (FN)	d (TN)

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- *Total population having the disease (cases):* 'a + c' (TP + FN)
- *Total population not having the disease (healthy):* 'b + d' (FP + TN)
- *Total population:* a + b + c + d = TP + FP + FN + TN

Now, both cases (a + c) and healthy (b + d) are fixed in a population.
Thus if b (FP) increase, then d (TN) will reduce.
In the given question, higher FP (b) means a lower d (TN) or low specificity. Now both sensitivity and specificity are inversely related.
Thus Sensitivity will increase, will be higher

43. **Ans. (a) Prior probability of SLE, sensitivity and specificity of test** *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p107-08; AIIMS 2011]*
    - Post-test probability of a disease in a population (PTP) IS SAME AS PPV
    - Pre-test probability of a disease in a population (pTP) IS SAME AS Prevalence

    In the given question, a patient is clinically diagnosed as having SLE
    Thus, to determine the probability of SLE at this point (Post-test probability of SLE OR PPV), one would need to know Prior probability of SLE (Pre-test probability OR Prevalence of SLE); sensitivity and specificity of each test

44. **Ans. (d) False negative** *[Ref. K. Park 23/e p141]*
    In the given graph, Persons on the right side of diagnostic point (i.e., blood sugar level > 120 mg/dl) are declared as having the disease (= A + C). Similarly, those on the left side of diagnostic point (i.e., blood sugar level < 120 mg/dl) are declared as not having the disease (= B + D).

    Since A + C = Declared diseased; A = True positives and C = False positives
    AND since B + D = Declared non-diseased; B = True negative and D = False negative

45. **Ans. (d) Prior probability of each test, Sensitivity and specificity of each test** *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p58]*

46. **Ans. (c) High validity, low reliability** *[Ref. Park 23/e p137, 138]*
    - Reliability is precision (repeatability) and Validity is accuracy (close to true/actual value)

    In the given question, 10 successive readings are all different and they have a mean value of 9.4+10.4+9.6+9.1+10.8+12.1+10.1+9.8+9.2+9.5/10 = 10.0

    Thus it has low reliability (non-consistent) and high validity (close to true/actual value of 10.2)

47. **Ans. (a) Increases** *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p58]*
48. **Ans. (e) None of the above** *[Ref. K. Park 23/e p139]*
49. **Ans. (a) Prevalence is 5%; (b) Sensitivity is 70%; (c) Specificity is 80%** *[Ref. K. Park 23/e p139]*
50. **Ans. (c) PPV** *[Ref. K. Park 22/e p131-32]*
51. **Ans. (a) True positive/True positive + false negative** *[Ref. K. Park 22/e p131]*
52. **Ans. (a) Sensitivity** *[Ref. K. Park 23/e p139]*
53. **Ans. (b) Sensitivity** *[Ref. K. Park 23/e p139]*
54. **Ans. (c) Increase positive predictive value** *[Ref. Park 23/e p139-140]*
55. **Ans. (b) Prevalence** *[Ref. K. Park 23/e p140]*
56. **Ans. (a) It increases with prevalence** *[Ref. Park 23/e p140]*
57. **Ans. (a) Sensitivity 70%** *[Ref. Park 23/e p139]*
58. **Ans. (c) 95%** *[Ref. Park 23/e p139]*
59. **Ans. (c) TN + FN** *[Ref. Park 23/e p139]*
60. **Ans. (b) d/ b+d** *[Ref. Park 23/e p139]*
61. **Ans. (c) Sensitivity 90%, Specificity 95%** *[Ref. Park 23/e p139]*

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In the given question, first make the table in correct format as below,

	Diseased	Non-diseased
Test positive	27 (a)	5 (b)
Test negative	3 (c)	95 (d)

Now, Sensitivity = a/(a+c) × 100 = 27/30 × 100 = 90%

Specificity = d/(b+d) × 100 = 95/100 × 100 = 95%

Review Questions

62. **Ans. (a) True positive/True positive + false negative** *[Ref. Park 23/e p139]*
63. **Ans. (a) Persons have disease but show negative test result** *[Ref. Park 23/e p140]*
64. **Ans. (b) Few false negative** *[Ref. Park 23/e p139-140]*
65. **Ans. (b) High incidence and Low prevalence** *[Ref. Park 23/e p140]*
66. **Ans. (d) Incidence of disease** *[Ref. Park 23/e p139-140]*
67. **Ans. (d) True positives** *[Ref. Park 23/e p139]*
68. **Ans. (b) 0.9** *[Ref. Park 23/e p139]*
69. **Ans. (b) Sensitivity** *[Ref. Park 23/e p139]*

MISCELLANEOUS

70. **Ans. All Choices** *[Ref. Park 23/e p386-387]*
71. **Ans. (d) Dental caries** *[Ref. Health Policies and Programmes in India by Dr. D.K. Taneja, 9/e p141-42, 307, 326, 329]*
    - *Diabetes mellitus:* Under 'National programme for Prevention and Control of Diabetes, Cardiovascular diseases and Stroke', screening is done by Urine for glucose (2 hours after a meal), Fasting blood sugar or random blood sugar (confirmatory testing is done by Standard Oral Glucose Test – 2hour value after 75 grams glucose)
    - *Carcinoma cervix:* Under 'National Cancer Control Programme', Visual inspection with Acetic acid (more realistic) have been recommended
    - *Refractive errors:* Under 'National Programme for Control of Blindness (school vision screening programme) screening for refractive errors is recommended once every 6 months
    - *Dental caries:* Under 'National Oral Health care Programme', components of pilot project (XI Five Year Plan) include oral health education, IEC and strengthening oral health set-up at district level/PHCs/CHCs
72. **Ans. (b) CA-125 for Ovarian cancer** *[Ref. Holland Fries Cancer Medicine 8, Volume 8, p441]*
    EXPLANATION
    - *Endometrial cancer screening:*
      - Pap smear (Not much useful; only recommended for Cervical cancer)
      - Ultrasonography
      - Office endometrial washings
      - Colour flow imaging
    - *Ca-125 in not useful in screening ovarian cancers:*
      - CA125 increases only in late stages of cancer
      - CA125 gives a lot of False positive results
      - CA125 WITH USG is a good screening test
73. **Ans. (a) CA-125** *[Ref. Primary Care Medicine by Goroll & Mulley, 6/e p824]*
    - CA 125 as marker of carcinomas
      - Ovarian cancer (Most common use)
      - Endometrial cancer
      - Fallopian tube cancer
      - Breast cancer

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- Lung cancer
- GIT cancer
- Pancreatic cancer

74. Ans. (b) 1 Week after the menstruation *[Ref. Health Promotion in Nursing by Huerta, 3/e p240]*

75. Ans. (d) Testicular carcinoma *[Ref. Internal Medicine by Stoller, p6]*

- Screening is NOT routinely recommend for following carcinomas:
  - Testicular carcinoma
  - Lung carcinoma
  - Ovarian carcinoma

Review Questions

76. Ans. (b) Screening *[Ref. Park 23/e p135]*

77. Ans. (c) Sputum smear examination by direct microscopy *[Ref. Park 20/e p164; Park 21/e p169, Park 22/e p170]*

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CHAPTER

5

Communicable and Non-communicable Diseases

GENERAL EPIDEMIOLOGY

Period of Communicability

- *Chickenpox:* 1 – 2 days before to 4 – 5 days after appearance of rash[Q]
- *Measles:* 4 days before to 5 days after appearance of rash[Q]
- *Rubella:* 7 days before symptoms to 7 days after appearance of rash
- *Mumps:* 4 – 6 days before symptoms to 7 days thereafter
- *Influenza:* 1 – 2 days before to 1 – 2 days after onset of symptoms
- *Diphtheria:* 14 – 28 days from disease onset[Q]
- *Pertussis:* 7 days after exposure to 3 weeks after paroxysmal stage
- *Meningococccus:* Until absent from nasal and throat discharges[Q]
- *Tuberculosis:* As long as not treated
- *Poliomyelitis:* 7 – 10 days before and after onset of symptoms[Q]
- *Hepatitis A:* 2 weeks before to 1 week after onset of jaundice
- *Hepatitis B:* Till disappearance of HBsAg & appearance of anti-HBs[Q]
- *Tetanus:* None[Q]

I Chickenpox: 1 – 2 days before to 4 – 5 days after appearance of rash
Measles: 4 days before to 5 days after appearance of rash

Common Gestational Periods for Vertical Transmission of Diseases

- *Congenital Varicella:* First trimester[Q]
- *Congenital Rubella:* First trimester[Q]
- *Congenital Parvovirus:* Second Trimester[Q]
- *Congenital Syphilis:* Third trimester[Q]
- *Congenital Toxoplasmosis:* Third trimester
- *Congenital Hepatitis B:* Third trimester[Q]
- *Congenital CMV:* Third trimester[Q]
- *Congenital HIV:* During delivery[Q]
- *Congenital Hepatitis C:* During delivery[Q]
- *Congenital Herpes:* During delivery[Q]

I Congenital Rubella: First trimester

Incubation Periods of Common Diseases

Disease	Causative or ganism	IP
Smallpox	Variola virus	7 – 14 days
Chickenpox	Human (alpha) herpes virus 3[Q]	14 – 16 days
Measles (Rubeolla)	RNA paramyxovirus[Q]	10 – 14 days[Q]
Rubella (German Measles)	RNA Togavirus[Q]	14 – 21 days
Mumps	RNA Myxovirus	14 – 21 days
Influenza	Orthomyxovirus	18 – 72 hours[Q]
Diphtheria	Corynebacterium diphtheriae	2 – 6 days[Q]
Pertussis (Whooping cough)	Bordetella pertussis	7 – 14 days
Meningococcal meningitis	Neisseria meningitis	3 – 4 days
SARS	Corona virus[Q]	3 – 5 days
Tuberculosis	Mycobacterium tuberculosis	Weeks – years
Poliomyelitis	Poliovirus	7 – 14 days[Q]
Hepatitis A	Enterovirus 72[Q] (Picornavirus)	15 – 45 days[Q]

I Measles (Rubeolla) RNA paramyxovirus[Q] 10 – 14 days[Q]

I Hepatitis A Enterovirus 72[Q] (Picornavirus) 15 – 45 days

Contd...

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I Hepatitis B Hepadna virus 45 – 180 days

I Staphylococcal food poisoning Staphylococccus aureus 1 – 6 hours

I Yellow fever Flavivirus fibricus 2 – 6 days

I Ebola virus 2–21 days

Hepatitis B	Hepadna virus	45 – 180 days[Q]
Hepatitis C	Hepacivirus	30 – 120 days
Hepatitis D	Deltavirus	30 – 90 days
Hepatitis E	Calcivirus	21 – 45 days
Cholera	Vibrio cholerae	1 – 2 days[Q]
Typhoid fever	Salmonella typhi	10 – 14 days[Q]
Staphylococcal food poisoning	Staphylococccus aureus	1 – 6 hours[Q]
Ascariasis	Ascaris lumbricoides	2 months
Ancylostomiasis (Hookworm)	A. duodenale	5 weeks – 9 months
Guinea worm (Dracunculiasis)	Dracunculus medinensis	1 year
Dengue	Arbovirus	3 – 10 days[Q]
Malaria	Plasmodium vivax	8 – 17 days
	Plasmodium falciparum	9 – 14 daysQ
	Plasmodium malariae	18 – 40 days
	Plasmodium ovale	16 – 18 days
Lymphatic filariasis	Wuchereria bancrofti[Q]	8 – 16 months[Q]
Rabies	Lyssavirus type 1 (Rhabdovirus[Q])	3 – 8 weeks
Yellow fever	Flavivirus fibricus[Q]	2 – 6 days[Q]
Japanese encephalitis	Group B arbovirus (Flavivirus)	5 – 15 days
KFD	Arbovirus (Flavivirus)	3 – 8 days
Chikungunya fever	Chikungunyavirus (Arbovirus A)	4 – 7 days
Leptospirosis	Leptospira interrogans	4 – 20 days
Bubonic plague	Yersinia pestis	2 – 7 days
Pneumonic plague	Yersinia pestis	1 – 3 days
Septicemic plague	Yersinia pestis	2 – 7 days
Scrub typhus	Rickettsia tsutsugamushi[Q]	10 – 12 days
Q fever	Coxiella burnetti[Q]	2 – 3 weeks
Taeniasis (Tapeworms)	T. solium, T. saginata	8 – 14 weeks
Leishmaniasis (Kala azar)	L. donovani	1 – 4 months
Trachoma	Chlamydia trachomatis	5 – 12 days
Tetanus	Clostridium tetani	6 – 10 days[Q]
Yaws	Treponema pertenue[Q]	3 – 5 weeks
HIV/ AIDS	HIV/ HTLV – III/ LAV	Months – 10 years[Q]
Swine flu	H1N1 Type A Influenza	1 – 4 days[Q]
Crimean Congo Fever	Nairovirus[Q]	1 – 3 days
NIPAH Virus	Hendra/Henapi virus[Q]	14 – 16 days
Ebola Virus	Ebola virus	2 – 21 days
Anthrax	Bacillus anthracis	1–7 days
Brucellosis	Bacillus melitensis	5–60 days

Important Human Parasites

Parasite	Causative organism
Roundworm	Ascaris sp. Ascaris lumbricoides[Q]
Balantidiasis	Balantidium coli
Tapeworm	Taenia solium/ saginata

Contd...

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Contd...

Coccidia	Cryptosporidium
Guinea worm	Dracunculus medinensis[Q]
Amoebiasis	Entamoeba histolytica
Pinworm	Enterobius vermicularis[Q]
Liver fluke	Fasciola hepatica[Q]
Giardia	Giardia lamblia
Hookworm	Necator americanus[Q]
Head louse	Pediculus humanus
Body louse	Pediculus humanus corporis
Crab louse	Phthirus pubis
Scabies	Sarcoptes scabiei[Q]
Strongyloidiasis	Strongyloides stercoralis
Toxocariasis	Toxocara canis, Toxocara cati
Toxoplasmosis	Toxoplasma gondii
Trichinosis	Trichinella spiralis
Whipworm	Trichuris trichiura, Trichuris vulpis

Host of a Disease

- HOST: A person or other animal, including birds & arthropods, that affords subsistence or lodgement to an infectious agent under natural (as opposed to experimental) conditions
  - *Primary (definitive) host:* host in which parasite attains maturity or passes its sexual stage[Q]
  - *Secondary (intermediate) host:* host in which parasite is in larval or asexual stage[Q]

Disease	Parasite	Host	
		Primary	Secondary
Malaria[Q]	Plasmodium	Anopheles	Man
Tapeworm	Taenia solium	Man	Pigs
Tapeworm	Taenia saginata	Man	Cattle
Guinea worm[Q]	Dracunculus medinensis	Man	Cyclops
Filariasis	Wuchereria bancrofti	Man	Culex
Hydatid Disease[Q]	Echinococcus	Dog	Sheep, Cattle, Man
Sleeping sickness	Trypanosomes	Man	Tse tse fly

- *Obligate host:* Only Host for a Parasite. Eg: Man in Measles, Man in Typhoid Fever[Q]
- *Transport host:* A carrier in which the organism remains alive but does not undergo development
- *Paratenic host:* Is similar to an intermediate host, only that it is not needed for the parasite's development cycle to progress
  - *Difference between a paratenic and reservoir host:* Latter is a primary host, whereas paratenic hosts serve as "dumps" for non-mature stages of a parasite which they can accumulate in high numbers
- *Dead-end host:* Is an intermediate host that does generally not allow transmission to the definite host, thereby preventing the parasite from completing its development. For e.g. humans are dead-end hosts for Echinococcus canine tapeworms

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Arboviral Infections in India[Q]

Group A (Alpha viruses)	Others
Sindbis	Sandfly fever
Chikungunya	Umbre
Group B (Flaviviruses)	Chandipura
JE	Ganjam
KFD	Minnal
Dengue	Dhori
West Nile fever	African Horse sickness

SMALLPOX AND CHICKEN POX

Smallpox

- *Epidemiological reasons/basis for Smallpox eradication*[Q]*:*
  - No known animal reservoir
  - No long term carrier state
  - Infection provides lifelong immunity
  - Case detection simple due to characteristic rash
  - Subclinical cases did not transmit the disease
  - A highly effective vaccine was available
  - International cooperation

Chickenpox

- *Synonym:* 'Varicella'
- *Causative agent:* Varicella zoster virus [Human (alpha) Herpes Virus – 3][Q]
- *Incubation period:* 14 – 16 days[Q]
- *Source of infection:* Case (person-to-person contact)
- *Mode of transmission:* Air droplets (respiratory)
- *Period of communicability:* 1-2 days before to 4-5 days after appearance of rash
- *Secondary Attack rate*[Q]*:* 90%
- *Rash:* Had to be differentiated from rash of Smallpox

I

Chicken pox rash
Dew drop on rose petal appearance
Centripetal distribution
Pleomorphic rash

Chickenpox rash	Smallpox rash
Dew drop on rose petal appearance[Q]	—
Centripetal distribution[Q]	Centrifugal distribution
Pleomorphic rash[Q]	Non-pleomorphic
Superficial & Unilocular	Deep seated & Multilocular
Inflammation around vesicles present	No inflammation around vesicles
Affects flexor surfaces, involves axilla	Affects extensor surfaces, spares axilla
Spares palms and soles	Affects palms and soles
Rapid evolution	Slow evolution
Scabs form after 4 – 7 days	Scabs form after 10 – 14 days

- *MC late complication of chickenpox:* Shingles (caused by reactivation of the virus decades after the initial episode of chickenpox)
- *Most rapid and sensitive means of diagnosis*[Q]*:* Examination of vesicle fluid under electron microscope (shows round particles)
- *Congenital Varicella:* Most threatening if transmitted in Ist trimester of pregnancy
- *Live attenuated Chickenpox Vaccine:*
  - *Strain:* OKA strain[Q]
  - *Seroconversion*[Q] *:* >90%

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- *Varicella Zoster immunoglobulin (VZIG):*
  - Given within 72 hours of exposure
  - *Dose:* 1.25 – 5.0 ml intramuscularly
  - *Reserved for:*
  - Immunosuppressed contacts of acute cases
  - Newborn contacts

MEASLES

Measles (Rubeola)

- *Causative agent:* RNA paramyxovirus (so for only one serotype known)
- *Incubation Period:* 10-14 days[Q]
- *Source of Infection:* cases (carriers are not known to occur[Q])
- *Mode of transmission:* Air droplets (respiratory)
- *Period of Communicability[Q]:* 4 days before and 5 days after the appearance of rash (*Rash:* Retro-auricular origin[Q])
  - Measles is highly infectious during pro-dromal period and during eruption
- Measles has no second attacks (life long immunity seen)
- *Secondary attack rate of Measles[Q]:* 80%
- *Measles shows a cyclical trend[Q]:* Increase every 2-3 years
- *Pathogonomic clinical feature of Measles[Q]:* Koplik spots (buccal mucosa opposite upper 2nd molar)
- *MC complication of measles in young children[Q]:* Otitis media
  - SSPE (Subacute Sclerosing Pan Encephalitis) is a rare complication of measles[Q]: 7 per million cases of Measles (7-10 years after initial infection)
- *Measles is prevented by:*
  - *Active immunization by measles vaccine:*
  - Live, attenuated
  - *Strains:* Edmonston Zagreb (MC), Schwarez, Moraten
  - Passive immunization by measles immunoglobulin (WHO recommended dose: 0.25 ml/kg body weight[Q])

> *Incubation Period:* 10-14 days
> (carriers are not known to occur)
> *Secondary attack rate of Measles[Q]:* 80%
> Koplik spots (buccal mucosa opposite upper 2nd molar)
> *MC complication of measles in young children:* Otitis media

WHO Measles Elimination Strategy[Q]: 'Catch up, Keep up, Follow up'

- *Catch up:* Nationwide, vaccination campaign targeting all children 9 months to 14 years of age, irrespective of history of Measles disease or vaccination status
- *Keep up:* Routine services aimed at vaccinating more than 95% of each successive birth cohort
- *Follow up:* Subsequent nationwide vaccination campaigns conducted every 2–4 years targeting usually all children born after the catch-up campaign.
- *Challenges for Measles Elimination:*
  - Weak immunization systems
  - Highly infectious nature
  - Inaccessible populations (e.g. those in conflict)
  - Refusal to immunization
  - Changing epidemiology (increased transmission among adolescents/adults)
  - Need to provide Catch-up campaign to >130 million children in India
  - Gaps in human and financial resources at country/regional/global levels
- *Accelerated Measles Mortality Reduction Strategy (WHO-UNICEF):* Two doses of Measles containing vaccine (MCV) to all children through routine and supplementary immunization activities
- *Global Measles Elimination Targets by 2015:*
  - Routine vaccine coverage >90% nationally
  - Routine vaccine coverage >80% district level
  - Reduction and annual maintenance of incidence <5 cases per million
  - Reduction of Measles mortality by 95%

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- *Global Measles and Rubella Strategic Plan 2012-2020:*
  - High population coverage with 2 doses of Measles and Rubella containing vaccines
  - Effective surveillance
  - Outbreak preparedness
  - Generate Public confidence in vaccination
  - Research and development

RUBELLA

Rubella (German Measles)

I *Incubation period:* 14 – 21 days

- *Causative agent:* RNA virus of Togavirus family[Q]
- *Incubation period:* 14 – 21 days[Q] (~18 days)
- *Source of infection:* Cases or subclinical cases
  - 'No known carrier state' for postnatally acquired rubella[Q]
- *Mode of transmission:* Air droplets (respiratory)
- *Period of communicability:* One week prior to onset of symptoms to one week after rash appears
- *Immunity for Rubella:*
  - Single attack confers life long immunity (Second attacks rare)
  - 40% of reproductive age group females are susceptible in India[Q]

  Infants protected till 4-6m age
- *Most widely used test for diagnosis:* Heme-agglutination Inhibition test (HAI)

Rubella Vaccine

I **Rubella Vaccine** Live attenuated, 'strain RA 27/3'

- *Type of vaccine:* Live attenuated, 'strain RA 27/3'[Q] [Vaccine virus non-communicable]
- *Dose and route:* 0.5 ml, subcutaneous
- Rubella vaccine is contraindicated in pregnancy and not given to infants
  - *If female vaccinated for rubella:* Advice against pregnancy for next 3 months[Q]
- *Priority groups for rubella vaccination in India:*
  - *1st PRIORITY:* 15 – 49 years reproductive age group females[Q]
  - *2nd priority:* All children 1 – 14 years age
  - *3rd priority:* Routine universal immunization of all children aged 1

Congenital Rubella Syndrome (CRS)

I *Infection in I trimester:* MOST DISASTROUS TIME

- *CRS is said to have occurred if*[Q]*:*
  - Infant has IgM rubella antibodies shortly after birth, or
  - IgG antibodies persist for more than 6 months
- Major determinant of extent of fetal infection in CRS: Gestational age at which fetal transmission occurs
- *Infection in I trimester:* MOST DISASTROUS TIME[Q]
  - Abortions
  - Still births
  - *Skin lesions:* blueberry muffin lesions[Q]
  - 'Triad of Congenital Rubella Syndrome' [*Congenital heart defects (MC is PDA*[Q]) + Cataracts + Sensorineural deafness]
- *Infection in early part of II Trimester:* Deafness (only)
- *Infection after 16 weeks POG:* No major abnormalities
- *Risk of fetal damage in CRS:*

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Stage of gestation	% fetuses infected	% fetuses damaged among infected	Overall risk of damage
< 11 weeks	90	100	90
11 – 16 weeks	55	37	20
17 – 26 weeks	33	0	0
27 – 36 weeks	53	0	0

MUMPS

- Causative agent: Myxovirus parotiditis (RNA paramyxovirus)
- *Incubation Period:* 14-21 days[Q]
- *Source of Infection:* Clinical & subclinical cases
- *Mode of transmission:* Air droplets (respiratory)
- *Period of Communicability:* 4-6 days before to 7 days after onset of symptoms
- Mumps show life long immunity
- *Secondary attack rate of Mumps[Q]:* 86%
- *Clinical features:*
  - Salivary (esp. Parotid) glands involvement[Q]
  - *MC complication[Q]:* Aseptic meningitis
  - *MC complication in adolescents[Q]:* Orchitis, Oopheritis
- *Mumps is prevented by:* Active immunization by Mumps vaccine:
  - *Type:* Live attenuated vaccine[Q]
  - *Strain:* Jeryll Lynn strain[Q]

I *MC complication[Q]:* Aseptic meningitis

INFLUENZA

Influenza

- *Causative agent:* Orthomyxovirus, 3 types: A, B, C
  - *Type A:* MC cause of outbreaks/ epidemics[Q]; Only cause of pandemics[Q]
  - Type B
  - *Type C:* Not circulating currently
- *Currently circulating influenza viruses in world:*
  - H_1N_1 (Type A) – Cause of Swineflu[Q]
  - H_2N_2 (Type A)
  - H_5N_1 (Type A) – Cause of Avian influenza (Birdflu)[Q]
  - H_3N_2
  - H_7N_9
  - H_5N_6
  - Type B
- *Cyclical trends in Influenza[Q]:*
  - Type A epidemics every 2 – 3 years
  - Type B epidemics every 4 – 7 years
  - Type A pandemics every 10 – 15 years
- *Antigenic variations in Influenza:* (MC in Type A[Q])

I H_1N_1 (Type A) – Cause of Swineflu

	Antigenic shift[Q]	Antigenic drift[Q]
Occurs due to	Genetic recombination/ reassortment/ rearrangement	Point mutation[Q]
Nature	Sudden	Gradual/ insidious
May lead to	Epidemics/ Pandemics[Q]	Sporadic cases

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- *Incubation period:* 18 – 72 hours[Q]
- *Period of infectivity:* 1 – 2 days before to 1 – 2 days after onset of symptoms[Q]

Avian Influenza

- Also known as 'Bird flu' or 'Highly pathogenic avian influenza'
- *Causative agent*[Q]*:* H5N1 (Type A Influenza virus)
- *Avian Influenza is a Pandemic:* Origin from Hong Kong (1997)
- *Drug of choice*[Q]*:* Oseltamivir (Tamiflu) 75 mg BD × 5 days (contraindicated in infants)

Influenza: Pandemic (H1N1) Influenza 2009 [NEW NOMENCLATURE: Influenza A (H_1N_1) pdm 09]

- *WHO declaration of Influenza pandemic:* 11 June 2009
  - *World is now post-pandemic EXCEPT:* INDIA and NEW ZEALAND (locally intense transmission)
  - *Problem statement India:* 37000 cases, 1833 deaths [May 2009 – August 2010]
- *Incubation period:* 2–3 days
- *Clinical features:*
  - *Uncomplicated influenza:* Influenza like illness (Fever, cough, sorethroat, rhinorrhoea, headache, muscle pain), GIT illness (diarrhoea WITHOUT dehydration)
  - *Complicated/severe influenza:* Pneumonia, CNS involvement, Severe diarrhoea, Secondary complications,
  - Exacerbation of chronic diseases
  - *Progressive disease:* Oxygen impairment/cardiopulmonary insufficiency, CNS complications, Invasive secondary bacterial infection, Severe dehydration
- *Risk factors of severe disease*[Q]*:*
  - Infants and children < 2 years
  - Pregnant females
  - COPD
  - Chronic cardiac disease
  - Metabolic disorders
  - Chronic renal/hepatic/neurological/hemoglobinopathies/immunosuppression (INCLUDING HIV) disorders
  - Children on aspirin therapy
  - Persons aged > 65 years
  - Morbid obesity
- *Laboratory diagnosis:*
  - *Most timely and sensitive detection:* RT-PCR test[Q]
  - *Samples:* Nasopharyngeal + throat swabs [Tracheal/bronchial aspirates in lower respiratory tract infection cases][Q]
  - *Point-of-care/Rapid diagnostic tests:* Not recommended
- *Duration of isolation:* for 7 days after onset of illness OR 24 hours after resolution of fever/respiratory symptoms whichever is longer
- *Antiviral therapy:*
  - *Severe/progressive clinical illness:* Oseltamivir[Q] (if not available or resistance, use Zanamivir)
  - *High risk of severe/complicated illness:* Oseltamivir OR Zanamivir
  - *Not high risk OR Uncomplicated confirmed/suspected illness:* No need of treatment
  - *Dosage:*
    - Oseltamivir 75 mg BD × 5 days
    - Zanamivir 2 inhalations (2 × 5 mg) BD × 5 days

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DOC for H_1N_1
Oseltamivir 75 mg
BD × 5 days

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Oseltamivir dosages[Q]

Treatment	Prophylaxis
By weight < 15 kg: 30 mg BD × 5 days 15-23 kg: 45 mg BD × 5 days 24-39 kg: 60 mg BD × 5 days ≥ 40 kg: 75 mg BD × 5 days	**By weight** <15 kg: 30 mg OD 15-23 kg: 45 mg OD 24-39 kg: 60 mg OD ≥ 40 kg: 75 mg OD
For infants < 3 months: 12 mg BD × 5 days 3-5 months: 20 mg BD × 5 days 6-11 months: 25 mg BD × 5 days	**For infants** < 3 months: Not recommended unless critical 3-5 months: 20 mg OD 6-11 months: 25 mg OD

Avian Influenza H_7N_9

- Origin: China 2013
- Spread to: Hong Kong
- *Disease burden:*
  - *Cases:* 141
  - *Deaths:* 45
  - *Case fatality rates:* 33%
- *MC age group affected:* Older males (>50 years age)
- *Mode of transmission:* Respiratory (Live bird markets)
  - Human to human transmission: Rare but possible
- *Treatment:* Neuraminidase inhibitors
  - Oseltamivir
  - Zanamivir

Vaccines for Influenza

- *Killed vaccines:*
  - 2 doses, 3 – 4 weeks apart, 0.5 ml (for age > 3 years), subcutaneous
  - 70 – 90% protective efficacy; duration 3 – 6 months
  - Is rarely associated with Guillain-Barré Syndrome[Q] (GBS)
- *Live attenuated vaccines:*
  - Stimulate local + systemic immunity
  - Antigenic variations presents difficulties in manufacture
- *Newer vaccines*[Q]*:*
  - *Split – virus vaccine:*
    - Also known as 'Sub-virion vaccine'
    - Highly purified
    - Lesser side effects
    - Less antigenic – multiple injections required
    - Useful for children
  - *Neuraminidase – specific vaccine:*
    - Sub-unit vaccine containing N-antigen
    - Permits subclinical infection – long lasting immunity
  - *Recombinant vaccine:*
    - Antigenic properties of virulent strain transferred to a less virulent strain
  - *Contraindications to Inactivated Influenza vaccines:*
    - Severe allergy to chicken eggs
    - History of hypersensitivity/anaphylactic reactions previously
    - Development of Guillain-Barré Syndrome (GBS) within 6 weeks of vaccine
    - Infants less than 6 months age
    - Moderate-to-severe illness with fever

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H_1N_1 (Swine flu) Vaccine

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H_1N_1 Inactivated vaccine: Strain: A/California/7/2009

- *H_1N_1 Inactivated vaccine: Single i/m injection*
  - *Strain:* A/California/7/2009 (H1N1) V like strain[Q]
  - *Storage temperature*: +2° to +8° C
  - *Contraindications:* History of anaphylaxis/severe reaction/Guillian Barre Syndrome, Infants < 6 months, Moderate-to severe illness with fever
  - *Protective immunity:* Develops after 14 days (NOT 100%)
- *H_1N_1 Live attenuated vaccine: Nasal spray*
  - *Side effects:* Rhinorrhoea, nasal congestion, cough, sore throat, fever, wheezing, vomiting
- *Priority groups (in order) for Influenza vaccines:*
  - Pregnant women[Q]
  - Age > 6 months with chronic medical conditions
  - 15-49 years healthy young adults
  - Healthy young children
  - Healthy adults 49-65 years
  - Healthy adults >65 years

Categorization of H_1N_1 Cases in India 2014-15[Q]

Category A patients Mild fever plus cough/sore throat with or without body ache, headache, diarrhoea and vomiting

- Do not require Oseltamivir
- Treat symptomatically
- Patients be monitored for their progress and reassessed at 24-48 hours
- No testing of the patient for H_1N_1 is required
- Patients should confine themselves at home and avoid mixing up with public and high risk members in the family

Category B patients: In addition to all the signs and symptoms mentioned under Category-A, if the patient has,

1. High grade fever and severe sore throat
   - Home isolation and Oseltamivir
2. One or more of the high risk conditions Children with mild illness but with predisposing risk factors/Pregnant women/Persons aged 65 years or older/Patients with lung diseases, heart disease, liver disease, kidney disease, blood disorders, diabetes, neurological disorders, cancer and HIV/AIDS/Patients on long term cortisone therapy
   - Oseltamivir
   - No tests for H_1N_1 is required
   - Patients should confine themselves at home and avoid mixing with public and high risk members in the family

Category C patients: In addition to the above signs and symptoms of Category-A and B, if the patient has,

1. Breathlessness, chest pain, drowsiness, fall in blood pressure, sputum mixed with blood, bluish discoloration of nails
2. Children with influenza like illness who had a severe disease as manifested by the red flag signs (Somnolence, high and persistent fever, inability to feed well, convulsions, shortness of breath, difficulty in breathing, etc)
3. Worsening of underlying chronic conditions
   - Testing, immediate hospitalization and treatment

DIPHTHERIA

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Carriers are more important as source of infection: Diphtheria

Diphtheria

- *Causative agent:* Corynebacterium diphtheriae, a gram positive non-motile organism

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- Diphtheria is an endemic disease in India
- *Source of infection:* Case or carrier
  - *Carriers are more important as source of infection:* 95% of total disease transmission[Q]
  - Nasal carriers are more dangerous than throat carriers[Q]
  - *Incidence of carriers in a community:* 0.5-1%
  - Immunization does not prevent carrier state[Q]
- *Incubation Period:* 2-6 days[Q]
- *Mode of transmission:* droplet infection (main mode), directly from cutaneous lesions and fomites
- *Period of Infectivity:* 14-28 days from onset of disease; longer for carriers[Q]
  - A case/carrier may be considered non-communicable when atleast 2 cultures from nose and throat, 24 hrs apart, are negative[Q]

DPT Vaccine

Refer to Chapter 3, Theory

Schick Test

- *Schick Test:* An intradermal test of immunity status and hypersensitivity to Diphtheria toxin
- *Dose:* 0.2 ml (1/50 MLD) of Schick test toxin in test arm and 0.2 ml of heat inactivated toxin in opposite 'control' arm
- *Interpretations of Schick Test:*

Observation		Reading	Interpretation[Q]
Test arm	**Control arm**		
No reaction	No reaction	NEGATIVE	Immune to diphtheria
Red flush	No reaction	POSITIVE	Susceptible to diphtheria
Red flush fading by 4th day	Red flush fading by 4th day	PSEUDOPOSITIVE	Hypersensitivity
Red flush	Pseudopositive	COMBINED	Susceptibility & Hypersensitivity

(Red flush=Positive reaction)

- Schick test negative if, >0.03 units antitoxin per ml in blood serum
- *Schick test has been replaced by:* Hemagglutination Test[Q]
- *Hemagglutination Test:* Measurement of serum antitoxin level

WHOOPING COUGH

Pertussis/ Whooping Cough

- *Causative agent:* Bordetella pertussis (5% cases by B. parapertussis)
- Also known as '*Whooping Cough*' or '*100 Day Cough*'[Q]
  - Paroxysms of cough are followed by an inspiratory whoop (high pitch)
- *Incubation period:* 7 – 14 days
- *Source of Infection:* Case
  - There is no subclinical or chronic carrier state[Q]
  - Neither vaccination nor infection confers long-term immunity
- *Secondary Attack rate*: > 90%[Q]
- *Incidence and fatality:* Females > Males
- Leukocytosis does not correlates with the severity of cough
- *Chief complications:* Brochitis, bronchopneumonia, bronchiectasis, subconjunctival hemorrhages, epistaxis, hemoptysis, punctuate cerebral hemorrhages, convulsions and coma.

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I *Drug of choice*[Q] of Pertussis Erythromycin

- *Laboratory diagnosis:* Culturing of nasopharyngeal swabs on Bordet-Gengou medium, polymerase chain reaction (PCR), immunofluorescence (DFA), and serological methods
- *Drug of choice*[Q]: Erythromycin (40 mg/kg QID × 10 days)
- *Vaccines:* DPT [Refer to Chapter 3, Theory]

MENINGOCOCCAL MENINGITIS

Meningococcal Meningitis/ Cerebrospinal Fever

- *Causative agent:*
  - N. meningitidis, a gram negative diplococci
  - Serotypes A, B, C, D, 29E, W135, X, Y
- Meningococcal disease is endemic in India
- *Carriers are the more important source of infection than cases*[Q]
  - Mean duration of Temporary carriers: ~ 10 months
  - During epidemics, carrier rate may go up to 70-80%
- *Mode of Transmission:* Droplet infection
- *Incubation Period:* 2-10 days (average 3-4 days)
- *Case Fatality Rate (CFR) of Meningococcal meningitis*[Q]: 80%
  - With early diagnosis and treatment, CFR < 10%
- *Drugs of Choice:*

I Chemoprophylaxis of contacts of Meningococcus: Rifampicin

Management	Drug of choice
Treatment of cases	Penicillin
Treatment of carriers	Rifampicin[Q]
Chemoprophylaxis of contacts	Rifampicin[Q]

(For chemoprophylaxis : Rifampicin 600 mg BD X 2 days[Q]*)*

- Treatment with Penicillin does not eradicate carrier state[Q]

Meningococcal Vaccine

- *Type of Vaccine:* Killed vaccine, cellular fraction
- *Dose:* 0.5 ml
- *Route:* Subcutaneous
- *Site:* Antero-lateral thigh. Middle one-third
- Booster every 3 years
- Available for group A, C, W135 and Y meningococci
  - *Vaccine is not available for Group B meningococcus:* Group B polysaccharide is non-immunogenic[Q]
- *Contraindications*[Q]*:*
  - Pregnancy
  - Infants and children < 2 years of age (due to development of immunologic tolerance)

I Vaccine is not available for Group B meningococcus:

ARI/ PNEUMONIA

No Pneumonia: Cough or Cold

- *No chest indrawing*, No fast breathing
- *Management:*
  - No antibiotics necessary
  - Treat symptomatically
- If cough > 30 days, refer for assessment

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Pneumonia (Not severe)

- No chest indrawing
- Fast breathing present (based on respiratory rate - RR)

Age group	Respiratory rate cut-off for fast breathing[Q]
0 – 2 months	RR > 60 per minute
2 – 12 months	RR > 50 per minute
12 months – 5 years	RR > 40 per minute

- *Management:*
  - At home
  - Give antibiotics – *Drug of choice Cotrimoxazole*[Q]
  - Reassessment after 2 days

I Drug of choice Pneumonia: Cotrimoxazole

Severe Pneumonia

- *Signs*[Q]*:*
  - Chest indrawing
  - Nasal flaring
  - Grunting
  - Cyanosis
- *Management:*
  - Give first dose of referral antibiotic (Ampicillin + Gentamicin)
  - REFER URGENTLY to hospital;
  - Drugs of Choice[Q] – Benzyl Penicillin (or Ampicillin or Chloramphenicol) for first 48 hours and then Procaine Penicillin (or Ampicillin or Chloramphenicol) for next 3 days
  - Antibiotics to be changed if there is no improvement after first 48 hours

I Drugs of Choice[Q] Severe Pneumonia: Benzyl Penicillin

Very Severe Pneumonia

- *Signs*[Q]*:*
  - Convulsions, abnormally sleepy or difficult to awake
  - Stridor when calm
  - Stopped feeding
  - Wheezing
  - Fever or low body temperature
  - Severe malnutrition
- *Management:*
  - Give first dose of referral antibiotic (Ampicillin + Gentamicin)[Q]
  - REFER URGENTLY to hospital
  - Drug of Choice[Q] – Chloramphenicol i/m for first 48 hours and then oral chloramphenicol till total 10 days
  - Antibiotics to be changed (to i/m Cloxacillin + Gentamicin) if there is no improvement after first 48 hours

I Drug of Choice[Q] Very Severe Pneumonia: Chloramphenicol

TUBERCULOSIS

Tuberculosis Situation in India

- *Country with highest TB burden in world:* India
- *Infected with TB (Mantoux positive)*[Q]*:* Two out of five Indians (40%)
- *Annual risk of becoming infected with TB:* 1.5% [Q]
- *Lifetime risk of disease among infected:* 10%
- *Indians developing TB everyday:* 5000[Q]
- *Sputum positive every year:* 0.8 million
- *TB deaths per year:* 0.37 million

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Epidemiological Indices for TB

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1% ARI corresponds to: 50 SS +ve cases per 100,000 general population

- *Incidence of TB infection (Annual infection rate, Annual risk of infection- ARI):* Percentage of population under study who will be newly infected with TB among non-infected in 1 year
  - *Expresses attacking force of TB in community*
  - *In developing countries 1% ARI corresponds to:* 50 SS +ve cases per 100,000 general population[Q]
  - Tuberculin conversion index is the 'best indicator for evaluation of TB problem and its trend' in the community[Q]
- *Prevalence of TB infection:* Percentage of individuals who show a positive reaction to standard tuberculin test
  - Represent cumulative experience of population in 'recent as well as remote infection' with TB[Q]
  - Tuberculin test is the 'only way of estimating the prevalence of infection in a population'[Q]
- *Incidence of disease:* Percentage of new TB cases per 1000 population
  - Reveals trend of problem, including impact of control measures
  - Is of utility only in countries where high proportion of new cases are detected and notification is reliable
  - Sputum smear examination (AFB) is a reliable method for estimation[Q]
- *Prevalence of disease or case rate:* Percentage of individuals whose sputum is positive for TB bacilli on microscopic examination[Q]
  - 'Best available practical index to estimate case load' in community[Q]
  - Age specific prevalence is most relevant index
- *Prevalence of suspect cases:* Is based on X ray examination of chest
  - No epidemiological significance is attached to this index
- *Prevalence of drug-resistant cases:*
  - Is directly related to chemotherapy
- *Mortality rate:*
  - Was earlier used as an index of magnitude of TB problem

Tuberculin/ PPD

- *Tuberculin*[Q]*:* Purified protein derivative (PPD) has replaced the antigen old tuberculin (OT)
  - *Tuberculins have also been prepared from atypical mycobacterium:* PPD-Y (M. Kansasii), PPD-B (Battey mycobacterium), Scrofula (M. scrofulaceum)
- Discovered by Von Pirquet (1907)
- PPD is a purer preparation, gives fewer non-specific reactions and is easier to standardise
  - *Standard PPD (PPD-S) contains* [Q]*:* 50,000 tuberculin units (TU) per mg [1TU= 0.00002 mg PPD]
  - WHO advocates 'PPD-RT-23 with Tween-80'[Q]
- *Dosage:* First strength (1TU), Intermediate strength (5TU), Second strength (250TU)
- *Tuberculin test conversion* is defined as an increase of 10 mm or more within a 2-year period, regardless of age[Q]
- *Tuberculin test in use:*
  - *Mantoux intradermal test:* More precise test of tuberculin sensitivity
  - *Heaf test:* Quick, easy, reliable and cheap, preferred for testing large groups
  - *Tine multiple puncture test* unreliable, not recommended
- Tuberculin test is the 'only way of estimating the prevalence of infection in a population'[Q]
- Tuberculin test has lost its sensitivity as an indicator of the true prevalence of infection, in countries with high coverage of BCG[Q]
  - True prevalence rates are exaggerated by infection with atypical mycobacteria and boosting effect of a second dose of tuberculin

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Mantoux Test (Tool for detection of TB infection) (Pirquet Test)

- *Tuberculin test conversion*: Increase of > 10 mm within 2 years period
- *Dose* [Q]*:* 1 TU of PPD in 0.1ml injected intradermally on forearm
- *WHO advocated preparation* [Q]*:* PPD–RT–23 with Tween–80
- Is a test of prognostic significance
- Has limited validity due to lack of specificity
- *Readings*[Q]*:* Result read after 72 hrs (3d)
- *Only induration is measured:*
  - *Induration >9 mm:* Positive (Past OR current infection with TB)[Q]
  - *Induration 6-9 mm:* Doubtful (M. tuberculosis or Atypical mycobacteria)
  - *Induration <6 mm:* Negative[Q]
- *False Reactions:*

False +ve Mantoux[Q]	False –ve Mantoux[Q]
Faulty technique of injection	Pre-allergic phase
Using degraded tuberculin	High fever
Too deep injection	Measles and chickenpox
Infection of other mycobacterium[Q]	Whooping cough
Repeated tuberculin testing	Malnutrition
Prior BCG vaccine[Q]	HIV/AIDS[Q]
	Use of anti-allergic drugs
	Use of immunosuppressants

- *Results of tuberculin test must be interpreted carefully:* The person's medical risk factors determine at which increment (5 mm, 10 mm, or 15 mm) of induration the result is considered positive
  - *5 mm or more is positive in:*
    - HIV-positive person[Q]
    - Recent contacts of TB case
    - Persons with nodular or fibrotic changes on chest x-ray consistent with old healed TB
    - Patients with organ transplants
    - Other immunosuppressed patients
  - *10 mm or more is positive in:*
    - Recent arrivals (less than 5 years) from high-prevalence countries
    - Injection drug users
    - Residents and employees of high-risk congregate settings (e.g., prisons, nursing homes, hospitals, homeless shelters, etc.)
    - Mycobacteriology lab personnel
    - Persons with clinical conditions that place them at high risk (diabetes, prolonged corticosteroid therapy, leukemia, end-stage renal disease, chronic malabsorption syndromes, low body weight)
    - Children less than 4 years of age, or children and adolescents exposed to adults in high-risk categories
  - *15 mm or more is positive in:*
    - Persons with no known risk factors for TB[Q]

Sputum Microscopy and Culture

- *Sputum smear examination (Z-N Staining) by direct microscopy:* is the 'method of choice as a case finding tool for tuberculosis'[Q]

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Dose[Q]: 1 TU of PPD in 0.1ml
Readings[Q]: Result read after 72 hrs (3d)

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- *Sputum culture examination:* is offered as a centralized service at district and regional chest clinic laboratories
  - only meant for chest symptomatic who are smear negative
  - useful for carrying out sensitivity tests and monitoring drug treatment

Mass Miniature Radiography (MMR[Q])

- Is not used now as a case finding tool
- Only useful:
  - As an additional criterion for diagnosis of Pulmonary TB, when none sputum smear is positive out of two
  - To exclude bronchiectasis/aspergilloma in frequent/severe is positive sputum smear cases
  - In suspected complication in a breathless patient needing specific treatment (e.g. pneumothorax, pericardial effusion, pleural effusion)

Guidelines for Chemoprophylaxis in Children (< 6 years)

(who come in contact with a Sputum positive TB case)

IF	AND	THEN
Symptoms of TB	Clinician declares TB	Cat I DOTS given
No symptoms of TB	Tuberculin test NA	Isoniazid 5 mg/kg X 6 months[Q]
	Tuberculin test available	Isoniazid 5 mg/kg X 3 months, then do test If induration < 6 mm: Stop INH, Give BCG If induration > 6 mm: Continue INH for 3 months

(INH: Isoniazid; NA: Not available)

The Stop TB Strategy[Q]

- *Vision*: A TB-FREE WORLD
- *Goal*: To dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals and the Stop TB Partnership targets
- *Targets*:
  - MDG 6, Target 8: Halt and begin to reverse the incidence of TB by 2015
  - Targets linked to the MDGs and endorsed by the Stop TB Partnership:

1. *by 2015*[Q]: Reduce prevalence and deaths due to TB by 50% compared with a baseline of 1990
2. *by 2050*[Q]: Eliminate TB as a public health problem

The End TB Strategy 2016-2035[Q]

- *Vision*: A world free of TB
  - Zero deaths, disease and suffering due to TB
- *Goal*: End the Global TB Epidemic

Indicators	Milestones[Q]		Targets[Q]	
	2020	2025	SDG 2030	End TB 2035
Reduction in number of TB deaths compared with 2015 (%)	35%	75%	90%	95%
Reduction in TB incidence rate compared with 2015 (%)	20% (< 85/100,000)	50% (< 55/100,000)	80% (< 20/100,000)	90% (< 10/100,000)
TB-affected families facing catastrophic costs due to TB (%)	Zero	Zero	Zero	Zero

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TB Mission 2020

- *Launched*: 28 October 2014 by MOHFW, Government of India
- *Main Objective*: Eliminate TB form India by 2020[Q]
- *Components*:
  - Free diagnosis and treatment of all patients in any institution (Government or Private)
  - Banning commercial serology for TB diagnosis
  - Bringing Anti-TB drugs under separate schedule of National Drug law
  - Mandatory notification of New TB case

Latent Tuberculosis (LATENT TB, LTBI)

- *Description:* Latent tuberculosis is where a patient is infected with Mycobacterium tuberculosis, but does not have active tuberculosis disease
  - Latent TB are NOT INFECTIOUS
- *Main risk:* 10% will go on to develop active TB at a later life
- *Tests used to identify patients with latent TB:*
  - Tuberculin skin tests (Montaux test, Heaf test, Tine test)
  - alpha-interferon tests

National Reference Laboratories for TB in India

- National Institute for Research in Tuberculosis (NIRT), Chennai[Q]
- National Tuberculosis Institute (NTI), Bangalore[Q]
- National Institute of TB and Respiratory Diseases (NITRD)
- Delhi and National Japanese Leprosy Mission for Asia (JALMA)—Institute of Leprosy and other Mycobacterial Diseases, Agra[Q]
- Regional Medical Research Centre (RMRC), Bhubaneswar
- Bhopal Memorial Hospital and Research Centre (BMHRC), Bhopal

Revised National TB Control Program

Also Refer to Chapter 6, Theory

POLIOMYELITIS

Poliomyelitis Situation 2015 WORLD [as on 01 January 2016]

- Total cases: 70
- *2 endemic countries:*[Q]
  - Afghanistan
  - Pakistan
- *8 Vulnerable countries:*
  - Cameroon
  - Sudan
  - Somalia
  - Syria
  - Ethiopia
  - Nigeria
  - Guinea
  - Iraq

Poliomyelitis Situation 2015 INDIA [as on 31st December 2015]

- *Total cases:* NIL wild virus case [No case has been reported in India from 13 January 2011 onwards]
- 2 VDPV cases (P2) reported from India

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- P1 is MCC of epidemics
- 3 is MCC of VAPP
- For every 1 clinical case of polio: there are 1000 subclinical cases

Poliomyelitis Disease

- *Causative agent:* Poliovirus (serotypes 1, 2 and 3)
  - P1 is MCC of epidemics[Q]
  - P2 is Most antigenic and Most easily eradicable (Eradicated on 20 Sep 2015))
  - P3 is MCC of VAPP[Q] (Vaccine associated paralytic poliomyelitis) – 1 per 1 million chance[Q]
- *Reservoir:* Man[Q] (No chronic carriers[Q])
- MC clinical occurrence: Subclinical cases[Q]
  - For every 1 clinical case of polio: there are 1000 subclinical cases in children and 75 subclinical cases in adults[Q]
- *Infectious material:* Faeces and oro-pharyngeal secretions[Q]
- *Period of communicability:* 7-10 days before and after onset of symptoms
- *Risk factors for precipitation of an attack:*
  - Fatigue
  - Trauma
  - Intramuscular injections
  - Operative procedures (Tonsillectomy) esp. in epidemics of polio
  - Administration of Alum containing DPT vaccine
- *Incubation period:* 3 – 35 days (usually 7 – 14 days[Q])
- *Clinical presentation:*

Clinical spectrum	Infections	Remarks
Inapparent (Subclinical)	95%[Q]	No presenting symptoms; recognisable by isolation or rising antibody titres
Abortive polio (Minor illness)	4 – 8%	Mild or self-limiting illness; recognisable by isolation or rising antibody titres
Non-paralytic polio	1%	Synonymous with aseptic meningitis
Paralytic polio	< 1%	Descending asymmetric flaccid paralysis;

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Isolation of wild poliovirus from stool is 'the recommended method

Available Diagnostic Tests for Poliomyelitis

- *Stool examination:*
  - Isolation of wild poliovirus from stool is 'the recommended method for laboratory confirmation of paralytic poliomyelitis'[Q]
  - Recommended in every case of AFP
  - Virus usually can be found in the feces from onset to up to < 8 weeks after paralysis, with 'the highest probability of detection during the first 2 weeks after paralysis onset'[Q]
- *Cerebrospinal Fluid (CSF) examination:*
  - Not recommended for purposes of surveillance[Q]
  - Not likely to yield virus, so collection is not recommended for culture
  - However, the CSF cell count, gram stain, protein, and glucose may be very useful in eliminating other conditions that cause AFP
- *Throat examination:*
  - Not recommended for purposes of surveillance[Q]
  - Not as likely as stool to yield virus and thus specimen collection from this site is not recommended
- *Blood examination:*
  - Not recommended for purposes of surveillance[Q]
  - Not likely to yield virus, and current serologic tests cannot differentiate between wild and vaccine virus strains
  - Interpretation of the serologic data can often be misleading
  - Collection of blood specimens for culture or serology not recommended

Vaccines for Poliomyelitis

Refer to Chapter 3 Theory

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HEPATITIS

Types of Viral Hepatitis

Type	Causative agent	Incubation period[Q]	Common mode(s) of transmission
Hepatitis A	Enterovirus 72[Q] (picornavirus)	15 – 45 days[Q]	Faecal-oral[Q], sexual
Hepatitis B	Hepadnavirus[Q]	45 – 180 days[Q]	Sexual, perinatal, percutaneous
Hepatitis C	Hepacivirus (Flavivirus)	15 – 160 days	Percutaneous
Hepatitis D	Viriods like	30 – 180 days	Sexual, perinatal, percutaneous
Hepatitis E	Calcivirus (alphavirus like)	15 – 60 days	Faecal-oral[Q]

Hepatitis A

- *Causative agent:* Enterovirus 72[Q] (Picorna virus)
- *Incubation period:* 15-45 days[Q]
- *Period of infectivity:* 2 weeks before to 1 week after onset of jaundice
- *Sex distribution:* Equal in both sexes
  - *Children:* More infected but mild or subclinical
- *Reservoir:* Human cases
- *Modes of transmission:*
  - Faecal oral (Most common[Q])
  - Parenteral
  - Sexual
- *Disinfectant:*
  - Formalin
  - UV rays
  - Boiling for 5 min
  - Autoclaving

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Modes of transmission of Hepatitis A
Faecal oral (Most common[Q])

Hepatitis B

- Also known as *'Serum hepatitis[Q]'*
- *Causative agent:* Hepatitis B virus (HBV) – a Hapdnavirus
  - Is double shelled DNA virus – 'Dane's particle[Q]'
  - Discovered by Bloomberg
- *Reservoir of infection:* Man (case or carrier)
- *Incubation period:* 45 – 180 days[Q] (6 weeks – 6 months)
  - Median IP < 100 days[Q]
- *Modes of transmission:* Blood borne, sexual, parenteral, perinatal[Q]
- *Markers of Hepatitis B infection (in order of appearance in serum[Q]):*
  - *HBsAg (Hepatitis B surface antigen):*
    - Also known as 'Australia antigen'[Q]
    - First antigen to appear in serum – 'first evidence of infection'[Q]
    - 'Epidemiological marker of Hepatitis B infection'[Q]
  - *HBcAg (Hepatitis B core antigen):*
    - Alone does not appear in serum[Q]
  - *HBeAg (Hepatitis B envelope antigen):*
    - Is a secretory form of HBcAg
    - 'Indicates active viral replication'[Q]
    - 'Is a marker of infectivity for Hepatitis B'[Q]
    - *Persistence beyond 3 months:* Increased likelihood of chronic Hepatitis B
  - *Anti-HBc (Antibody to Hepatitis B core antigen):*
    - First antibody to appear in serum[Q]
    - IgM Anti-HBc indicates a diagnosis of acute Hepatitis B[Q]
    - IgG Anti-HBc persists indefinitely

I
– *Incubation period:* 45 – 180 days
– HBsAg 'Epidemiological marker
– HBeAg Is a marker of infectivity
– IgM Anti-HBc indicates a diagnosis of acute Hepatitis B

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- *Anti-HBe (Antibody to Hepatitis B envelope antigen):*
  - Signals 'stoppage of active viral replication'[Q]
- Indicates 'end of period of infectivity'[Q]
- *Anti-HBs (Antibody to Hepatitis B surface antigen):*
  - Last antibody to appear in serum
  - Signals 'recovery, end of period of communicability'[Q]

- *Serologic patterns in Hepatitis B:*

HBsAg	Anti-HBs	Anti-HBc	HBeAg	Anti-HBe	Interpretation
+	–	IgM	+	–	Acute Hepatitis B[Q]
+	–	IgG	+	–	Chronic Hepatitis B + replication
–	+	IgG	–	+	Recovery from Hepatitis B
–	+	–	–	–	Vaccinated individuals[Q]

- *Vaccines for Hepatitis B:*
  - *Plasma derived vaccine:*
  - Is formalin inactivated sub-unit vaccine[Q]
  - Is based on HBsAg
  - Derived from carriers of Hepatitis B
  - *rDNA yeast derived vaccine:*
  - Recombinant DNA vaccine (genetically engineered)
- *Hepatitis B Immunoglobulin:*
  - *Required for immediate protection:*
  - Surgeons, nurse, laboratory workers
  - Newborn infants of carrier mothers
  - Sexual contacts of acute Hepatitis B patients
  - Ideally administered within 6 hours[Q] (not later than 48 hours)
  - *Dose:* 0.05 – 0.07 ml/kg, 2 doses 30 days apart

Hepatitis E

I Enterically transmitted hepatitis non-A, non-B

- *Synonym:* Enterically transmitted hepatitis non-A, non-B [HNANB[Q]]
- *Description:* HEV is essentially a waterborne disease, transmitted through water or food supplies, contaminated by faeces
- *Incubation Period:* 2 – 9 weeks
- *HEV in pregnancy:* Fulminant form is common in Hepatitis E infection during Pregnancy (up to 20% cases) with a high case fatality rate[Q] (up to 80%)

DIARRHOEAL DISEASES (CHOLERA AND TYPHOID)

Oral Rehydration Solution (ORS)

- ReSoMal (Rehydration Solution for Malnourished): Is recommended for severely malnourished children

Composition[Q] (grams)	Osmolar concentration (mmol/litre)	
1 WHO ORS packet +	Sodium	45
2 litres water +	Potassium	40
50 grams sugar +	Chloride	70
40 grams electrolyte/ mineral solution	Citrate	7
	Glucose	125
	Mg^{++} Zn^{++} Cu^{++}	4
	Total	300

- NEW WHO RECOMMENDED Reduced Osmolarity Oral Rehydration Solution (Low Na ORS):[Q]

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Composition[Q] (grams)		Osmolar concentration[Q] (mmol/litre)	
Sodium chloride	2.6	Sodium	75
Potassium chloride	1.5	Potassium	20
Sodium citrate	2.9	Chloride	65
Glucose	13.5	Citrate	10
		Glucose	75
Total	**20.5**	**Total**	**245**

Cholera

- Cholera is an acute diarrhoel disease caused by Vibrio cholerae
- Vibrio cholerae: 'Gram-negative bacterium' that produces cholera toxin (entero-toxin), which act on c-AMP system of mucosal cells of epithelium lining of the small intestine (to cause massive diarrhea)
  - Classical biotype
  - El Tor biotype [Serotypes: Ogawa (MC in India[Q]), Inaba and Hikojima]
  - Recently El Tor Hybrid subtype has become MC in India
- *Incubation period[Q]:* 1 – 2 days (Few hours – 5 days)
- *Reservoir:* Human beings only
- Rice-watery diarrhoea[Q]
- *Essentials for treatment of cholera:* Water and electrolyte replacement (ORS)
- *Laboratory diagnosis of Cholera:* Stool and swab samples collected in the acute stage of the disease, before antibiotics have been administered, are the most useful specimens for laboratory diagnosis
  - *Holding or transport media:*
    - *Venkataraman-ramakrishnan (VR) mediumCary-Blair medium:* Mostly widely used medium
    - Autoclaved sea water
  - *Enrichment media:*
    - Alkaline peptone water
    - Monsur's taurocholate tellurite peptone water
  - *Plating media:*
    - Alkaline bile salt agar (BSA)
    - Monsur's gelatin Tauro cholate trypticase tellurite agar (GTTA) medium
    - *TCBS medium:* Mostly widely used medium

I Cholera: Rice-watery diarrhoea

Guidelines for Cholera Control (WHO)

- *Verification of diagnosis:*
  - Identifying Vibrio cholerae 01 in stools OF FEW PATIENTS is sufficient
  - It is 'not necessary to culture stools of all cases or contacts'
- *Notification:*
  - Cholera is a notifiable disease locally, nationally and internationally[Q]
  - Under International Health Regulations, Cholera is notifiable to WHO by national govt WITHIN 24 HOURS (no. of cases & deaths to be reported daily and weekly)
  - An area is declared free of Cholera when TWICE the IP has elapsed since last case[Q]
- *Early case finding:* through aggressive case search
- Establishment of treatment centres
- *Rehydration therapy:* through ORS
- *Adjuncts to therapy:* Only antibiotics may be used when vomiting stops

I Cholera is a notifiable disease

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Group	Antibiotic of choice[Q]
Treatment	
Adults	Doxycycline
Children	Azithromycin
Pregnancy	Azith`romycin
Chemoprophylaxis	Tetracycline[Q]

I Mass chemoprophylaxis IS NOT ADVISED in cholera

I *Health education:* MOST EFFECTIVE prophylactic measure in cholera

- *Epidemiological investigations:* General sanitation measures, epidemiological studies
- *Sanitation measures:* Water control, excreta disposal, food sanitation, disinfection
- *Chemoprophylaxis:*
  - Mass chemoprophylaxis IS NOT ADVISED for total community; is only advisable for household contacts or a closed community[Q]
  - *Drug of choice for chemoprophylaxis:* Tetracycline[Q]
  - To prevent one case of cholera, 10,000 persons need to be given chemoprophylaxis
- Vaccination
- *Health education:* MOST EFFECTIVE prophylactic measure[Q]

Typhoid Fever

- *Causative agent:* Salmonella typhi
- *Reservoir of infection:* Man (cases and carriers)
  - Cases
  - Carriers
  - Incubatory carriers
  - *Convalescent carriers:* excrete bacilli for 6 – 8 weeks
  - *Chronic carrier:* excrete bacilli for > 1 year after clinical attack[Q]
- *Source of infection:* faeces, urine of cases/carriers (primary source) and water, food fingers, flies (secondary source)
- *IP:* 10-14 days[Q]
- *Mode of transmission:* Faeco-oral route, urine-oral route
- *Clinical features*[Q]:
  - 'Pea Soup diarrhoea'
  - Splenomegaly, relative bradycardia, dicrotic pulse, abdominal distension and tenderness
  - Rose spots[Q] (2nd week)
  - Intestinal perforation (3rd week[Q]) may be one of the complications
- *Laboratory Diagnosis:* **'BASU' Mnemonic**

Test of diagnosis	Time of diagnosis[Q]	Remarks
Blood culture	1st week	Mainstay of diagnosis
Antibodies (Widal test)	2nd week	Moderate sensitivity & specificity
Stool culture	3rd week	
Urine test	4th week	
Newer tests		
IDL Tubex test		Detects IgM antibodies
TYPHI DOT		Detects IgM & IgG antibodies
TYPHI DOT-M		Detects IgM antibodies
DIPSTICK TEST		Detects IgM antibodies

- *Drug of choice:*
  - *Cases:* Cephalosporins (Ceftriaxone), Quinolones
  - *Carriers:* Ampicillin/Amoxycillin + Probenecid × 6 weeks

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- *Immunisation for Typhoid:*
  - TYPHORAL (Live oral Ty21a[Q]) vaccine:
    - Contains >10^9 viable organism of attenuated S. typhi[Q]
    - *Schedule:* One capsule each on days 1, 3, 5 (booster of 3 doses, once every 3 yrs)
    - *Protection duration:* 3 years
  - *TYPHIM Vi Vaccine:*
    - Vi- Polysaccharide containing single dose i.m. or subcutaneous
    - Not given in age < 2 yrs
  - *TAB vaccine:*
    - Contains S.typhi, S.paratyphi A and S.paratyphi B

WORM INFESTATIONS

Guineaworm (Dracunculiasis)

- *Causative agent:* Dracunculus medinensis (nematode)
- *Guineaworm disease in India:*
  - *Last case in India:* July 1996 (Jodhpur, Rajasthan)
  - *India certified for Elimination of Guineaworm (WHO):* Feb 2000[Q]
  - *India certified Guineaworm disease free:* Feb 2001[Q]
- *Reservoir of infection:* An infected person (no animal reservoir)
- *Type of biological transmission:* Cyclo-developmental transmission[Q]
- *Type of disease:* Water based disease[Q] (Cyclops play a role in transmission)
- *Mode of transmission:* Consumption of water containing Cyclops harbouring infective stage of parasite[Q]
- *Guineaworm is amenable to eradication:*
  - Provision of safe drinking water
  - Control of Cyclops
  - Health education
  - Active surveillance for cases
- *Treatment of cases:* Niridazole[Q], Mebendazole and Metronidazole
  - No drug is effective for preventing disease transmission
  - No drug is suitable for mass treatment

I *Type of biological transmission:* Cyclo-developmental transmission

Roundworm (Ascariasis)

- *Importance:*
  - Is MC helminthic infection[Q]
  - Is MC worm infestation in India[Q]
- *Causative agent:* Ascaris lumbricoides
- *Reservoir of Infection:* Man[Q]
- *Mode of transmission:* Faecal-oral route[Q]
- *Incubation Period:* 2 months
- *Drugs of choice:*
  - Albendazole[Q]
  - Mebendazole
  - Pyrantel

I Roundworm: Is MC helminthic infection

I *Drugs of choice:* Albendazole

Hookworm (Ancylostomiasis)

- *Causative agent[Q]:*
  - Ancylostoma duodenale
  - Necator americanus
- *Reservoir of Infection:* Man
- *Mode of transmission:* Direct penetration of skin of foot and by oral route[Q]

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I *Hookworm infection is associated with:* Iron Deficiency Anemia

- *Incubation Period:*
  - 5 weeks - 9 months (A. duodenale)
  - 7 weeks (Necator americanus)
- *Hookworm infection is also known as:* miners' anaemia, tunnel disease, brickmaker's anaemia, Egyptian chlorosis
  - Average blood loss in hookworm infection: 0.03-0.2 ml/ worm/ day[Q]
- *Hookworm infection is associated with:*
  - Iron Deficiency Anemia[Q]
  - Hypoalbuminemia
- *Cutaneous larva migrans:* a skin disease in humans, caused by the larvae of various nematode parasites, the most common of which is Ancylostoma braziliense[Q]
- *Drugs of choice[Q]:*
  - Albendazole (A. duodenale)
  - Mebendazole (N. americanus)
- *Endemic Index (Chandler's Index[Q])*:
  - CI is average no of hookworm eggs per gram of faeces for the 'entire community'[Q]
  - *Interpretation of CI:* Kato-katz Technique is employed

Average no of eggs/gm stools	Interpretation
<200	Not much significance
200-250	Potential danger
250-300	Minor public health problem
> 300[Q]	Important public health problem

Tapeworm (Taeniasis)

I Definitive host, in Tapeworms Man

- *Causative agent:*
  - Taenia solium
  - Taenia saginata
- *Hosts of Infection:*

	Definitive host	Intermediate host[Q]
Taenia solium	Man	Pig
Taenia saginata	Man	Cattle

- *Mode of transmission:*
  - Ingestion of infective cysticerci in beef (T. saginata) or pork (T. solium)
  - Ingestion of food/ water/ vegetables contaminated with eggs
- *Incubation Period:* 8-14 weeks
- *Drugs of choice[Q]:*
  - Praziquantel
  - Niclosamide
  - Albendazole (Cysticercosis)

National Deworming Day (NDD)

- *National Deworming Day (NDD)*: 10th February[Q]
- *Objective[Q]*: Deworm all Pre-school and School aged children (both enrolled and unenrolled) through Schools and Anganwadi centers
- *Target beneficiaries[Q]*: 1-19 years age (Both boys and girls)
- *Linkage with*: Vitamin A prophylaxis program[Q]
- *Dosage[Q]*:
  - *1-2 years age*: Half tablet 400 mg Albendazole stat
  - *2-19 years age*: Full tablet 400 mg Albendazole stat

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DENGUE AND YELLOW FEVER

Dengue Fever and related Syndromes

- *Dengue viruses are arboviruses (Flavivirus) which may result in:*
  - Asymptomatic infection
  - Dengue
  - Dengue hemorrhagic fever (DHF)
  - Dengue shock syndrome (DSS)
- Dengue viruses have 4 serotypes[Q] (Den 1, 2, 3, 4)
- *Vector for dengue:* Aedes aegypti[Q]
- *Reservoir:* Man, Mosquito[Q]
- *Incubation period:* 5 – 6 days
- *Classical dengue fever (DF):*
  - Also known as 'breakbone fever'[Q]
  - *Clinical features[Q]:* High grade fever (biphasic curve) with chills, intense headache, muscle and joint pains, retro-orbital pain, photophobia, colicky pain, abdominal tenderness, skin rash
- *Dengue hemorrhagic fever (DHF):* Severe form of DF, caused by infection with more than one dengue virus type
  - *Incubation period:* 4 – 6 days
  - *Clinical features[Q]:* Features of DF plus
    - Rash less common
    - Rising hematocrit value (> 20% of baseline[Q])
    - Moderate-to-marked thrombocytopenia (< 1 lac/mm^3)
    - Hepatomegaly
    - *Positive tourniquet test[Q]:* > 20 petechiae per sq. inch
  - *Diagnosis of DHF:* Fever + hemorrhagic manifestations + thrombocytopenia + hemoconcentration or rising hematocrit
- *Dengue shock syndrome (DSS):*
  - *Diagnosis of DSSQ:* DHF + shock [rapid and weak pulse, narrow pulse pressure (< 20 mm Hg)/ hypotension, cold clammy skin, restlessness]

I Vector for dengue: Aedes aegypti

Yellow Fever (Yellow jack/ Black vomit/ American plague)

- *Causative agent:* Flavivirus fibricus (Togavirus Family, Gp B Arbovirus)
- *Reservoir of Infection[Q]:*
  - *Forest (Sylvian) Cycle:* Monkeys and Forest mosquitoes
  - *Urban Cycle:* Man (Sub clinical and clinical cases) and Aedes aegypti
- *Period of Communicability:*
  - *Man:* first 3 – 4 days of illness
  - *Mosquitoes:* Lifelong (after extrinsic IP of 8-12 days[Q])
- *Immunity:* Single attack provides life long immunity
  - *Infants born of Immune mothers have antibodies upto:* 6 months of life
- *Incubation Period:* 3-6 days[Q]
  - IP of 6 days recognized under International Health Regulations[Q]
- *Case fatality rate[Q]:* 80%
- *Yellow Fever Vaccine:*
  - Live attenuated, lyophilized (Freeze dried) vaccine[Q]
  - *Strain:* 17D strain (Chick Embryo grown)[Q]
  - *Cold chain Temperature:* – 30° to + 5°C
  - *Reconstitution with Diluent:* Cold physiological saline[Q]
  - *After reconstitution, use within:* ½ hour[Q]
  - *Dose:* 0.5 ml (irrespective of age)
  - *Route:* Subcutaneous[Q]
  - *Site:* At Insertion of Deltoid

I *Incubation Period:* 3-6 days in YF

I *Strain:* 17D strain in YF vaccine

I *WHO recommended validity of Vaccination Certificate for International travel:* from 10 days to 10 years for YF

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- *Immunity lasts:* From 7 days of Vaccination till 35 years[Q]
  WHO recommended validity of Vaccination Certificate for International travel: from 10 days to 10 years[Q]
- YF vaccine is the only Live vaccine that can be administered in Pregnancy (if there is risk of exposure)[Q]
- *Yellow Fever Vaccine and Cholera Vaccine cannot be given together:* Maintain a gap of 3 weeks or more between them[Q]

I *YF Control measures:*
- Distance around airports to be kept free of aedes breeding: 400 m[Q]
- Breteau Index (Aedes aegypti index) should be < 1% in towns and seaports

- *Indices of Surveillance of Aedes Mosquitoes*[Q]

$$\text{Container Index} = \frac{\text{No of containers showing breeding of Aedes larvae C+}}{\text{Total no of containers surveyed C}} \times 100$$

$$\text{House index} = \frac{\text{No of Houses showing breeding of Aedes Larvae H+}}{\text{Total no of Houses surveyed H}}$$

$$\text{Breteau Index} = \frac{\text{No of containers showing breeding of Aedes Larvae C+}}{\text{Total no of houses surveyed H}} \times 100$$

- *YF Control measures:*
  - Distance around airports to be kept free of aedes breeding: 400 m[Q]
  - Breteau Index (Aedes aegypti index) should be < 1% in towns and seaports[Q]

MALARIA

Anopheles Mosquito

I *An. culicifacies:* Vector of rural malaria
An stephensi: Vector of urban malaria

There are over 55 species of anopheline mosquitoes in India:
- *An. culicifacies:* Vector of rural malaria[Q]
- *An stephensi:* Vector of urban malaria[Q]; breed in overhead tanks[Q]
- *An. fluviatilis:* Efficient vector; highly anthrophilic; breed in moving water
- *An. sundaicus:* Breed in brackish water
- An. dirus
- An. minimus
- An. philippinensis
- An. maculates

Epidemiology of Malaria in India

- *Incubation period:*

Type	Incubation period
Plasmodium vivax	8 – 17 days (14 days)
Plasmodium falciparum[Q]	9 – 14 days (12 days)
Plasmodium malariae	18 – 40 days (28 days)
Plasmodium ovale	16 – 18 days (17 days)

- *Season:* Most common in July – November
- *Definitive host:* Anopheles mosquito (Intermediate host: Man[Q])
  - Is seen in both rural as well as urban areas
- *Vector:* An. culicifacies (rural) and An. stephensi (urban)

Modes of Malaria Transmission

- *Bite of female anopheline mosquitoes:*
  - *Infective forms:* Sporozoites[Q]
- *Injection of blood of a malaria patient containing asexual forms:* 'Trophozoite induced malaria'[Q]
  - Transfusion malaria[Q]
  - Congenital malaria
  - Malaria in drug addicts

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Life Cycle of Mosquito

- *Hosts involved in transmission of malaria*[Q]*:*

Man	Female anopheles mosquito
Secondary host	Primary host
Intermediate host	Definitive host
Asexual cycle	Sexual cycle
Schizogony	Sporogony

- *Human cycle of Plasmodium:*
  - *Pre-erythrocytic schizogony:*
    - Development of sporozoites in liver parenchyma
    - Liberated merozoites are called as 'Cryptozoites'
    - No clinical manifestation; No pathological change
    - Blood is sterile
  - *Erythrocytic schizogony:*
    - Parasite resides inside RBCs; passes through stages of Trophozoite, Schizont, Merozoite
    - Parasitic multiplication brings clinical attack of malaria
  - *Gametogony:*
    - Some merozoites develop in RBCs of spleen and bone marrow to form 'Gametocytes'
  - *Exo-erythrocytic schizogony:*
    - Persistence of late tissue phase in liver[Q]
    - Seen in P.vivax and P. ovale
    - Cause relapses in Vivax and Ovale malaria
    - Liberated merozoites are known as 'Phanerozoites'
- *Mosquito cycle of Plasmodium:*
  - *Completion of gametogony:*
    - Exflagellation of microgamete and maturation of gametes
    - Fusion of gametes form 'Zygote'; zygote matures to 'Ookinite'
  - *Sporogony:*
    - Oookinite develops into 'Oocyst'
    - On 10th day of infection, oocyst ruptures, releasing sporozoites; sporozoites reach salivary glands
    - Mosquito at this stage is capable of transmitting infection

Malariometric Measures in Pre-eradication Era

- *Spleen rate:* Percentage children 2–10 years age showing enlargement of spleen
  - Index used for measuring endemicity of malaria in a community[Q]
- Average enlarged spleen
- *Parasite rate:* Percentage children 2–10 years age showing parasites in blood films
- Parasite density index
- *Infant parasite rate:* Percentage infants showing parasites in blood films
  - Is 'most sensitive index of recent malaria transmission' in a locality[Q]
  - If IFR is zero for 3 consecutive years, it is regarded as absence of malaria transmission (even though anopheline may remain)
- *Proportional case rate:* Is no. of clinical malaria cases diagnosed per 100 patients attending hospitals and dispensaries

I *Infant parasite rate:* 'most sensitive index of recent malaria transmission'

Malariometric Measures in Eradication Era

- *Annual parasitic incidence (API):* Sophisticated measure of malaria incidence in a community[Q]

I API: Sophisticated measure of malaria incidence

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$$API = \frac{\text{Confirmed cases during one year}}{\text{Population under surveillance}} \times 1000$$

- *Annual blood examination rate (ABER):* (Index of operational efficiency[Q])

$$ABER = \frac{\text{Number of slides examined}}{\text{Population}} \times 100$$

I ABER: (Index of operational efficiency[Q])

- *Annual falciparum incidence (AFI)*
- *Slide positivity rate (SPR)*

$$SPR = \frac{\text{No. of blood semears + ve for parasite}}{\text{No. of blood smears examined}} \times 100$$

- *Slide falciparum rate (SFR)*

New Malaria Treatment Guidelines in India (2013 onwards)[Q]

See Annexure 12

Malaria Vaccine MOSQUIRIX (RTS, S)

- A recombinant protein-based malaria vaccine
  - World's first licensed malaria vaccine (July 2015) to be used in African babies
  - World's first vaccine licensed for use against a parasitic disease of any kind
- *Efficacy*: 26-50% in infants and young children
- *Components and mechanism*:
  - Engineered using genes from the repeat and T-cell epitope in the pre-erythrocytic circumsporozoite protein (CSP) of the Plasmodium falciparum malaria parasite and a viral envelope protein of the hepatitis B virus (HBsAg), to which was added a chemical adjuvant (AS01) to increase the immune system response
  - Infection is prevented by inducing humoral and cellular immunity, with high antibody titers, that block the parasite from infecting the liver

LYMPHATIC FILARIASIS

Problem Statement of Lymphatic Filariasis

- *Global:* Affects 120 million people in 120 countries[Q]; 1.1 billion people live in areas with risk of infection
- *SEAR:* 600 million live in endemic areas; 60 million infected
- *India:* Lymphatic filariasis is a major public health problem in India with 553 million people at risk in 233 districts; heavily endemic in UP, Bihar, Jharkhand, Andhra Pradesh, Orissa, Tamil Nadu, Kerala, Gujarat

Lymphatic Filariasis

I *Bancroftian Filariasis:* Vector is Culex quinquefasciatus (C. fatigans)

- *Description:* Lymphatic Filariasis covers infection with 3 closely related nematode worms
- *Causative Agents:*[Q]
  - Wuchereria bancrofti
  - Brugia malayi
  - Brugia timori
- *Definitive Host:* Man
- *Intermediate Host:* Mosquito
- *Vectors of Lymphatic filariasis:*
  - *Bancroftian filariasis:* Culex, Anopheles, Aedes
  - *Brugian filariasis:* Mansonia, Anopheles, Coquillettidia

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- *Main Vectors of Lymphatic filariasis in India:*
  - *Bancroftian Filariasis:* Culex quinquefasciatus (C. fatigans[Q])
  - *Brugian Filariasis:* Mansonia annulifers, Mansonia uniformis[Q]
- *Mode of Transmission:* Bite of Infected Vector mosquito
- *Stages of filariasis:*
  - P*re-Patent Period:* Time interval between inoculation of Infective larvae and first appearance of detectable microfilariae (Mf)
  - *Clinical Incubation Period:* Time interval between invasion of infectve larvae to development of clinical manifestations(~ 8-16 months)
  - *Mosquito becomes infective:* When third stage larvae migrates to Proboscis of mosquito vector
  - *Asymtomatic amicrofilaraemia stage:* Absence of Mf or clinical manifestations
  - *Asymptomatic microfilaraemia:* Blood positive for Mf but no clinical manifestations; act as carriers and an important source of infection
  - *Occult Filariasis (cryptic filariasis):* No clinical manifestations or Mf in blood
  - Due to a hypersensitivity reaction to Filarial Antigens
  - *Example:* Tropical pulmonary eosinophilia

Filaria Detection Tests

- *MC method used for epidemiological assessment of Lymphatic Filariasis (through mass blood survey):* Thick film using 20 cu. mm. of capillary blood (collected between 830pm upto 12 midnight[Q])
- *Most sensitive method for detecting low density microfilaraemia:* Membrane Filter Concentration Method
- *DEC Provocation test (100 mg DEC oral):* Mf can be induced to appear in blood during daytime
  - Blood is examined 1 hour after DEC administration
- *Good method to detect low density microfilariaemia, when other methods fail:* Xenodiagnosis
  - Mosquitoes allowed to feed on patients, then dissected 2 weeks later

Treatment of Filariasis

- *Chemotherapy of Filariasis[Q]:* Diethylcarbamazine (DEC)
  - *Bancroftian filariasis:* 6mg/kg/day X 12 days (Total 72 mg/kg[Q])
  - *Brugian filariasis:* 3-6 mg/kg/day X 6-12 days (Total 18-72 mg/kg)
  - DEC is effective in killing Mf
  - No effect on Infective (stage III) larvae
  - Uncertain effect on adult worm
- *Filariasis never causes explosive epidemics.* Favourable factors for success of control programme are:
  - Parasite does not multiply in Insect vector
  - Infective larvae do not multiply in Human Host
  - Life cycle of parasite is quite long (15 years or more)
- *DEC medicated salt:*
  - *Dose:* 1-4 gm DEC/kg of salt[Q]
  - Is a type of Mass Treatment[Q] (using very low dose of drug)
  - Treatment duration: 6-9 months
- National Filaria Control Programme (NFCP), 1955 is now a component of National Vector Borne Diseases Control Programme (NVBDCP), 2003-04
  - NVBDCP covers Malaria, Filariasis, Japanese Encephalitis, Kala Azar, Chikungunya fever and Dengue[Q]

I *Chemotherapy of Filariasis[Q]:* Diethylcarbamazine (DEC)

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Assessment of Filaria Control Programmes

Methods	Parameters	Inclusions
Clinical	Incidence of acute manifestations	Adenolymphangitis, epididymoorchitis, Lymphoedema, Hydrocoele, Chyluria
	Prevalence of Chronic Manifestations	
Parasitological	Mf rate (species specific)	% showing Mf in blood in population
	Filarial Endemicity Rate	Mf in blood and/ or disease manifestations
	Microfilarial density (Intensity of infecn)	No Mf per unit volume (20 mm^3) blood
	Average infestation rate (Prevalence of Mf)	Average no of Mf per positive slide.
Entomological	Vector density per 10 hour man catch % mosquito with Infective stage III Larvae Annual biting rate Types of larval breeding places	

RABIES

Rabies (Hydrophobia[Q])

- Hydrophobia is pathognomic[Q] (though few consider Aerophobia as pathognomic)
  - Causative agent: Lyssavirus Type 1 (Bullet shaped neurotropic RNA virus).
- Types of rabies virus: Street virus and Fixed virus

Characteristics	Street Virus (SV)	Fixed Virus (FV)
Source	Naturally occurring cases	Serial brain passage of SV
Incubation period	20 – 60 days	4 – 6 days
Pathogenicity	For all mammals	Sometimes pathogenic
Negri Bodies	Formed	Not formed
Importance	Cause rabies	Used for vaccine preparation[Q]

I *Negri bodies (Pathognomic of Rabies)*

- *Incubation period:* Variable [4 days to many years; ~ 3 to 8 weeks]
- Rabies is a dead-end infection in man[Q]
- *Negri bodies (Pathognomic of Rabies[Q]):* Intracytoplasmic eosinophilic inclusion bodies with basophilic granules in neurons
- *Mode of transmission:*
  - Animal bites (dogs, cats, monkeys, cow, goat, sheep, buffalo, horses EXCEPT RAT BITE and HUMAN BITE[Q])
  - Licks (on abraded skin or abraded/unabraded mucosa)
  - Aerosols (Rabies infected bats[Q])
  - Person to person: Rare but possible
  - Corneal and organ transplantation

Water: An Effective Natural Barrier against Rabies

- *Rabies-free area:* No case of Rabies in man or animals for past 2 years[Q]
- *Rabies is not found in:*
  - Australia[Q]
  - Cyprus
  - Ireland
  - Japan
  - Britain
  - Lakshadweep (India)[Q]
  - China (Taiwan)
  - Iceland
  - Malta
  - New Zealand
  - Andaman and Nicobar Islands (India)[Q]

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Local Wound Treatment

- *Cleansing:* Flush and wash wound area with plenty of soap and running water for minimum 5-10 minutes[Q]
- *Suturing:* not recommended; if necessary, do 24–48 hours later[Q]
- *Anti-rabies serum:* Local application with prior sensitivity testing
- *Observe animal:* for 10 days[Q]

Type of Contact, Exposure and Recommended Post-exposure Prophylaxis (PEP)

Category	Type of contact	Recommended PEP[a]
I	Touching or feeding of animals Licks on intact skin Contact of intact skin with secretions/ excretions of rabid animal/ human case	None, if reliable case history is available
II	Nibbling of uncovered skin Minor scratches or abrasions without bleeding	Wound management Anti-rabies vaccine
III	Single or multiple transdermal bites or scratches, licks on broken skin Contamination of mucous membrane with saliva (i.e. licks)	Wound management Rabies immunoglobulin Anti-rabies vaccine

Vaccines Approved for ID use in the Country

- Purified Chick Embryo Cell Vaccine (PCECV) - Rabipur, Vaxirab N
- Purified Vero Cell Rabies Vaccine (PVRV) - Verorab, Abhayrab, Indira

Vaccines Approved for IM use in the Country

- *Cell Culture Vaccines*: Human Diploid Cell Vaccine (HDCV), Purified Chick Embryo Cell Vaccine (PCECV), Purified Vero Cell Rabies Vaccine (PVRV)
- Purified Duck Embryo Vaccine (PDEV)

New Recommended Regimens/Schedules [NEW GUIDELINES]

Type of prophylaxis	Regimen
POST EXPOSURE INTRAMUSCULAR	
Essen Regimen (1-1-1-1-1)[a]	Day 0, 3, 7, 14, 28
POST EXPOSURE INTRADERMAL	
Updated Thai Red Cross Regimen (2-2-2-0-2)[a]	Day 0, 3, 7, 28
Post-exposure in vaccinated individuals[a]	Day 0, 3
Pre-exposure prophylaxis[a]	Day 0, 7, 21/ 28

- *Minimum potency*: 2.5 IU per i/m dose

Other Management Guidelines

- *Anti Rabies serum*:
  - *Horse Antirabies Serum:* 40 IU/ kg on Day 0 (50% in Wound, 50% i.m)
  - *Human Rabies Immunoglobulin*[Q]*:* 20 IU/kg (maximum in wound, rest i.m gluteal) (Concentration 150 IU/mL)
  - *Serum Sickness with Horse Serum:* 15 – 45%
- *Persons under Antirabic treatment should avoid:*
  - Alcohol (during and 1 month after treatment)
  - Undue physical and mental strain and late nights
  - Corticosteroids and other immunosuppressive agents

I *Human Rabies Immunoglobulin:* 20 IU/kg

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- *Intramuscular injections of Cell Culture and Purified Duck Embryo Vaccines:* Deltoid (not in Buttocks)
  - Volume of intradermal dose of Rabies Vaccine is 1/5th of intramuscular dose
  - Sites for intradermal rabies vaccines: Deltoid, Lateral thigh, Suprascapular region, Lower quadrant of abdomen
  - Booster injections in Pre-exposure prophylaxis: at intervals of 2 years
- *Immunisation of Dogs:* Primary Immunisation at 3-4 months and boosters at regular intervals
  - *BPL inactivated NTV:* Single dose 5ml for dogs (3ml for cats), revaccination after 6 months, subsequently every year
  - *Modified Live Virus Vaccine:* Single dose 3ml, boosters every 3 years
- *Most logical and cost effective approach for control of Urban Rabies:* Elimination of stray dogs and swift mass immunisation
  - Atleast 80% of entire dog Population of the area must be immunized

JAPANESE ENCEPHALITIS

Japanese Encephalitis (JE)

I *Pigs are 'Amplifier Hosts'*

- *Causative agent:* Group B arbovirus (Flavivirus)
- *Host factors:*
  - *Pigs are 'Amplifier Hosts'*[Q]*:* Pigs themselves do not manifest overt symptoms but circulate the virus
  - *Cattle and buffaloes are 'Mosquito attractants':* Infected but not the natural hosts of JE virus
  - Horses are only domestic animals which show signs of encephalitis due to JE virus
  - *Birds are also involved in Natural History:* pond herons, cattle egrets, poultry and ducks
  - *Man is an 'Incidental Dead end Host'*[Q] *:* Man to Man transmission is not seen. 85% cases occur in Children < 15 years of age

I *Vectors of JE:* Culex tritaeniorhynchus

- *Vectors of JE*[Q]*:* Culicine mosquitoes and some Anophelines
  - Culex tritaeniorhynchus (most important vector), Culex vishnuii and Culex gelidus
- *IP of JE in man:* 5 – 15 days (9 – 12 days in mosquitoes)
- *Case fatality rate:* 20 – 40% (may reach upto 58%)
- *Epidemiology in India:*
  - JE has been reported by 26 states and UT's in India
  - Gorakhpur District of UP contribute the largest no of cases[Q]
  - 85% of cases of JE are reported in age below 15 years BUT JE IS INFREQUENT IN INFANCY[Q]
  - Not all humans bitten by mosquitoes develop the disease: Ratio of JE overt disease to inapparent infection varies from 1:300 to 1:1000[Q]
  - Endemicity of JE in India: 1-2 cases per village[Q]

JE Vaccines

Vaccine	Strain(s)[Q]
Mouse brain derived, purified & inactivated vaccine	Nakayama Strain Beijing Strain
Cell culture derived, inactivated vaccine	Beijing P3 Strain
Cell culture derived, live attenuated vaccine	SA 14-14-2 Strain (in India)

- *Mouse brain derived inactivated vaccine:*
  - 2 primary doses 4 weeks apart, booster after 1 year and subsequently at 3 yearly intervals until the age of 10-15 years
  - *Dose:* 0.5 ml for children aged < 3 years (1 ml for age > 3 years)

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- *Route:* Subcutaneous
- Vaccine is most useful in interepidemic period
- *Pre-exposure prophylaxis*: 3 Primary doses on day 0, 7, 28 (or 2 primary doses 4 weeks apart)
- Booster after 1 year and then every 3 years

KFD

Kyasanur Forest Disease (KFD)

- KFD is also known as 'Monkey Disease'Q
- *Causative agent:* Group B Togavirus (Flavivirus)
- *Reservoir:* Rats and squirrels
- *Amplifier hosts:* PigsQ
- Man is 'incidental dead-end host'
- *Vectors of KFD:*
  - *In India:* Hemophysalis spinigeraQ (Hard Tick)
  - *Outside India:* Soft TickQ
- *IP:* 3 – 8 days
- *Control measuresQ:*
  - Control of ticks
  - Restriction of cattle movement
  - Vaccination: Killed KFD vaccine
  - Personal protection: through repellants

I

KFD is also known as 'Monkey Disease'
Vectors of KFD:
In India: Hemophysalis spinigeraQ (Hard Tick)

PLAGUE

Plague

- *Synonyms:* Black Death, Mahamari, The great death
- *Causative agent:* Yersinia pestisQ (Gram negative, non-motile cocco-bacillus)
  - Bipolar staining with Wayson's stainQ
- *Reservoir of Infection:* Wild rodents (Tatera indica in IndiaQ)
- *Source of Infection:* Infected rodents ,fleas and cases of pneumonic plague
- *Commonest and most efficient vector of Plague:* Rat flea (Xenopsylla cheopsisQ)
  - Both sexes of fleas bite and transmit the disease
- *Mode of transmission:* Bite of an infected flea, direct contact with tissues of infected animal or droplet infection (pneumonic plague)
- *Types of Plague:*

Type	IP	Remarks
Pneumonic Plague	1-3 days	Complication of Bubonic-Septicemic plague
Bubonic Plague	2-7 days	MC type of PlagueQ
Septicemic Plague	2-7 days	Occurs of Accidental laboratory infections

- *Drug of choice for treatmentQ:* Streptomycin 30 mg/kg i.m. × 7-10 days
- *Drug of choice for chemoprophylaxisQ:* Tetracycline 500 mg QID × 5 days

I

Vector of Plague: Rat flea (Xenopsylla cheopsis)

Flea Indices in Plague

- *Total flea index:* Is average no. of fleas of all species per rat
- *Cheopsis index:* Is average no. of X. cheopsis per rat; Is an 'indicator of potential explosiveness' if outbreak occursQ
- *Specific percentage of fleas:* Percentage of different fleas
- *Burrow index:* Average no. of fleas per species per rodent burrow

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RICKETTSIAL DISEASES

Rickettsial Zoonoses

Description: Are a group of specific communicable diseases caused by Rickettsial organisms and transmitted to man by Arthropod vectors (Q fever excepted)

Disease	Agent	Vector	Reservoir
Typhus Group[Q]			
Epidemic typhus	R. prowazekii[Q]	Louse[Q]	Humans[Q]
Murine typhus	R. typhi	Flea	Rodents
Scrub typhus	R. tsutsugamushi[Q]	Trombiculid mite	Rodents
Spotted Fever Gp			
Indian Tick typhus	R. conori	Tick	Rodents, dogs
RMSF	R. rickettsii	Tick	Rodents, dogs
Rickettsial pox	R. akari	Mite	Mice
Others			
Q Fever	Coxiella burnetii[Q]	NIL[Q]	Cattle, sheep, goat
Trench Fever	Bartonella quintana	Louse[Q]	Humans[Q]

Epidemic Typhus

I *Vector:* Louse for epidemic Typhus

- *Is a type of rickettsial disease of typhus group:*
  - *Recrudescent form of Epidemic typhus:* Brill Zinsser Disease[Q]
  - Was the 'most formidable rickettsial disease in past'
- *Causative agent:* R. prowazekii[Q]
- *Vector[Q]:* Louse (P. capitis, P. corporis)
- *Mode of transmission[Q]:* (IS NOT BY LOUSE-BITE)
  - Scratching and inoculation with infected louse faeces
  - Crushing infected louse on body
  - Inhalation of infected louse faeces or dust
- *Clinical picture:* Prolonged febrile illness, vasculitis
- *Drug of choice:* Tetracycline[Q]
- Under International Health Regulations (IHRs), 'Louse borne typhus is a disease under surveillance'

Endemic Typhus

- Is also known as 'Flea borne typhus' or 'Murine typhus'[Q]
- *Causative agent:* Rikettsia typhi (R. mooseri)
- *Reservoir:* Rats
- *Mode of transmission:* Rat flea (Xenopsylla cheopsis[Q]) – BUT NOT THROUGH BITE, rather through faeces inoculation on skin or inhalation of dried infective faeces
- *Incubation period:* 1 – 2 weeks
- *Weil-felix reaction:* Becomes positive with Proteus OX-19 in 2nd week
- *Drug of choice:* Tetracycline[Q]

Scrub Typhus

I *Scrub Typhus:*
– Causative agent: Rickettsia tsutsugamushi[Q]
– Vector: Trombiculid Mite[Q]

- Most widespread Rickettsial Disease[Q]
- *Causative agent:* Rickettsia tsutsugamushi[Q]
- *Vector:* Trombiculid Mite[Q] (Leptotrombidium delinese and L. akamushi)
- *IP:* 10-12 days
- *Typical clinical features:* Eschar (punched out ulcer covered with a blackened scar, indicates location of mite bite)
- Weil Felix Reaction is strongly positive with Proteus strain OXK

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Q Fever

- *Causative agent:* Coxiella burnetii[Q]
  - Only Rickettsial disease without any vector[Q] (soft tick in few animal cases)
  - Only Rickettsial disease without any skin lesion[Q]
- *Mode of Transmission:* Inhalation of Infected dust, Aerosol transmission, direct contact, Contaminated food like meat, milk and milk products[Q]
- IP: 2-3 weeks
- *Clinical features:*
  - Acute onset with fever, chills, general malaise and headache
  - 'Pneumonia like picture'[Q]
  - Absence of rash/local lesion
  - Inapparent infections
- *Treatment:*
  - Tetracycline[Q]
  - Pasteurization/Boiling of milk

I Q Fever
Mode of Transmission:
Inhalation of Infected dust

LEISHMANIASIS

Leishmaniasis

Causative agent of Leishmaniasis:

Types of Leishmaniasis	Causative agent
Visceral Leishmaniasis (Kala Azar)	Leishmania donovani[Q]
Cutaneous Leishmaniasis (Oriental Sore)	Leishmania tropica[Q]
Muco-Cutaneous Leishmaniasis	Leishmania braziliensis

- *Reservoir of Infection:* Dogs, jackals, foxes, rodents and other mammals
  - *Indian Kala Azar is a non-zoonotic infection:* Man as reservoir
- *Peak age of Kala Azar in India:* 5 – 9 years
- *Vectors:* Female phlebotamine sandflies

I Vectors: Female phlebotamine sandflies for Kala Azar

Types of Leishmaniasis	Vector[Q]
Visceral Leishmaniasis (Kala Azar)	Phlebotamus argentipes
Cutaneous Leishmaniasis (Oriental Sore)	Phlebotamus papatasi Phlebotamus sergenti

- *Habitat of Sandfly:* Cracks and crevices of walls, tree holes caves[Q]
- *Insecticide of choice for sandfly*[Q]*:* DDT (sprayed only up to a height of 6 feet from floor) 1 – 2 gm/sq. metre
- *Mode of transmission:*
  - Bite of female phlebotamine sandflies
  - Contamination of bite wound
  - Contact (crushing of insects while feeding)
  - Blood transfusion
- *IP:* 10 days to 2 years (average 1 – 4 months)
- *Aldehyde Test of Napier:*
  - Becomes Positive after 2-3 months of disease onset and reverts to negative 6 months after cure
  - Useful Test for surveillance[Q] (but not for diagnosis)
  - *Non- specific test:* Positive in many chronic infections where albumin: globulin ratio is reversed
- *Serological tests:*
  - *ELISA:* for diagnosis as well as epidemiological field survey[Q]
  - rk 39 dipstick test[Q]
  - Indirect Flourescent Antibody Test (IFAT)
  - Direct Agglutination Test (DAT)

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- *Leishmanin (Montenegro) test*[Q]*:*
  - *Procedure:* Intradermal injection of 0.1ml leishmanin (a preparation of 10 6/ml washed promastigotes suspended in 0.5% phenol saline) on flexor surface of forearm
  - *Examine after 48-72 hrs:*
    - *Induration > 5 mm:* positive
    - *Induration < 5 mm:* negative
  - *Useful Test for*:
    - Immunity status[Q]
    - Inferring endemicity or epidemicity of infection
    - Identifying groups at risk of infection
  - *Test results in Leishmaniasis:*

Type of Leishmaniasis	Test Result
Visceral Leishmaniasis (Kala azar)	
Active Phase	Negative
Within 1 yr of recovery	Positive
Cutaneous Leishmaniasis	Positive
Mucocutaneous Leishmaniasis	
4-6 weeks after onset	Positive

Prophylaxis and Treatment

- There are no drugs available for personal prophylaxis of Kala azar[Q]
- *Treatment of Leishmaniasis*[Q]*:*
  - Sodium stibogluconate (DOC in Kala Azar control Program)
  - Miltefosine
  - Pentamidine
  - Ketoconazole
  - Sitamaquine
  - Mepacrine
  - Paramomycin
  - Amphotericin B
  - Allopurinol
  - Urea stibamine

I *Treatment of Leishmaniasis*[Q]*:* Sodium stibogluconate–

TRACHOMA

Trachoma (Rough Eye)

- *Causative agent:* Chlamydia trachomatis (immune types A, B, C)
  - Sexually transmitted C. trachomatis (serotypes D, E, F, G, H, I, J, K) may cause a milder infection '*Inclusion Conjunctivitis*'
- IP: 5-12 days[Q]
- *Mode of transmission:*
  - Direct or indirect contact with ocular discharges or fomites
  - Eye seeking flies
  - Venereal transmission
- *MC infected age group:* 2-5 yrs aged children
- *Communicability:* Trachoma is a disease of low infectivity
- *Reservoir of infection:* Children with active disease, chronically infected older children and adults
- *Predisposing factors:* Direct sunlight, dust, smoke and irritants (such as kajal or surma)
- *Field diagnosis of Trachoma:* At least 2 of following diagnostic criteria in children 0-10 years age[Q]
  - Follicles on upper Tarsal conjunctiva
  - Limbal follicles or their sequelae (Herbert's Pits[Q])
  - Conjunctival scarring (Trichiasis, Entropion)
  - Vascular pannus

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- *WHO classification of Trachoma:*
  - *TIF (Trachomatous Inflammation Follicular):* Presence of > 5 large follicles on upper tarsal conjunctiva[Q]
  - *TII (Trachomatous Inflammation Intense):* Obscuration of > 50% of deep tarsal vessels of upper tarsal conjunctiva

Trachoma Treatment

- *Treatment of choice for Trachoma:* Azithromycin 20 mg/kg oral stat[Q]
- *Current WHO recommendations for antibiotic treatment of trachoma:*
  - *District level prevalence is > 10% in 1-9 years old children:* Mass treatment with Azithromycin[Q]
  - *District level prevalence is 5-10% in 1-9 years old children:* Targeted treatment with Azithromycin (the identification and treatment of all members of any family in whom one or more members have follicular trachoma)
  - *District level prevalence is < 5% in 1-9 years old children:* Azithromycin distribution may not be necessary
- *Mass treatment for Trachoma:* [NEW GUIDELINES–WHO]
  - *Indication of mass treatment in Trachoma:* > 10 % prevalence of severe and moderate Trachoma in children < 10 yrs of age [NEW GUIDELINES–WHO][Q]
  - *Treatment:* 1% tetracycline ointment BD for 5 consecutive days each month or OD for 10 days each month for 6 consecutive months, or for 60 consecutive days[Q]

I *Treatment of choice for Trachoma:* Azithromycin 20mg/kg oral stat

I *Indication of mass treatment in Trachoma:* > 10 % prevalence

SAFE Strategy[Q] (WHO)

- **S***urgery:* for Trichiasis and Entropion[Q]
- **A***ntibiotic use*: Azithromycin is Drug of choice
- **F**acial cleanliness
- **E**nvironmental improvement[Q]

I **SAFE Strategy[Q] (WHO)**
***S**urgery:*
Antibiotic use:
Facial cleanliness
Environmental improvement[Q]

TETANUS

Tetanus

- *Causative agent:* Clostridium tetani (Gram +ve, anaerobic, drumstick appearance)
- *Reservoir:* Natural habitat is soil and dust
- *IP:* 6-10 days (1 day to several months)[Q]
- *Period of communicability:* None[Q] (no person to person transmission)
- *Mode of transmission:* Contamination of Wounds with spores
- *Tetanus toxin:* Second most lethal toxin (Most lethal toxin is Botulinum toxin[Q])
  - *Lethal dose for a 70 kg man:* 0.1mg[Q]
  - *Acts on 4 areas of nervous system:*
    - Motor End Plates in Skeletal System
    - Spinal Cord
    - Brain
    - Sympathetic System
  - *Principal action:* Blocks inhibition of Spinal reflexes
  - Sensitivity to toxin is more in males
- *Herd Immunity in Tetanus:* Does not protect the individual
- *Tetanus is best prevented by:* Active immunisation with Tetanus toxoid (TT)
- Aim of active Immunisation with TT:
  - Vaccinate the entire community
  - Ensure protective level of antitoxin ~ 0.01 IU/ml serum throughout life

I *Period of communicability:* None for Tetanus

I *Herd Immunity in Tetanus:* Does not protect

Tetanus Toxoid in Pregnancy

Refer to Chapter 3, Theory

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Prevention of Tetanus in Wounded

	Treatment by type of wound	
Immunity Category	**Wounds < 6 hrs old, clean, non-penetrating, with negligible tissue damage**	**Other Wounds**
A	Nothing more required	Nothing more required
B	Toxoid 1 dose	Toxoid 1 dose
C	Toxoid 1 dose	Toxoid 1 dose + Human Tetanus Immunoglobulin
D	Toxoid complete course	Toxoid complete course + Human Tetanus Immunoglobulin

Where,

A. Complete course of toxoid or booster dose in previous 5 years
B. Complete course of toxoid or booster dose in previous 5-10 years
C. Complete course of toxoid or booster dose in >10 years ago
D. Has not had a complete course of toxoid or status is unknown

Neonatal Tetanus/ 8th Day Disease[Q]

- *NNT has a marked seasonal incidence in India:* > 50% of total annual cases occur in months of July, August and September
- *Cleans for safe delivery for prevention of NNT:*

3 Cleans	5 Cleans[Q]	7 Cleans
Clean Hands	Clean Hands	Clean Hands
Clean delivery surface	Clean delivery surface	Clean delivery surface
Clean Cord care	Clean Cord cut/blade	Clean Cord cut/blade
	Clean cord tie	Clean cord tie
	Clean cord stump	Clean cord stump
		Clean towel
		Clean water

  - 7 Cleans are proposed under RCH-III
  - Clean cord stump implies 'No Applicant'
  - Clean towel and clean water are for hands washing
- *NNT Elimination (Classification of districts, India is based on 3 parameters:* incidence rate, TT-2 or booster coverage and % attended deliveries)

Classification	Rate	TT-2 coverage	Attended deliveries
NNT High Risk	> 1/1000 LB	< 70%	< 50%
NNT Control	< 1/1000 LB	> 70%	>50%
NNT Elimination[Q]	< 0.1/1000 LB	> 90%	> 75%

- India was Declared Maternal & Neonatal Tetanus eliminated in August 2015.

I NNT Elimination < 0.1/1000 LB

LEPROSY/ HANSEN'S DISEASE

Leprosy Situation in India [2015]

- *Prevalence:* 0.68 per 10000 population[Q]
- *Annual new case detection rate:* 9.73 per 100,000 population
- *% children:* 9%
- *% MBL:* 53%
- 34 states/UTs achieved elimination
- *Cure rate:* 90-95%

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Classification in Leprosy

Classifications of Leprosy:

Ridley Jopling classification[Q]	Indian classification	Madrid classification
TT (Tuberculoid)	Indeterminate	Indeterminate
BT (Borderline Tuberculoid)	Tuberculoid	Tuberculoid
BB (Borderline borderline)	Borderline	Borderline
BL(Borderline Lepromatous)	Lepromatous	Lepromatous
LL (Lepromatous Leprosy)	Pure Neuritic[Q]	

(Pure neuritic type Leprosy (Indian classification): No skin lesions)

- *Operational Classification of Leprosy (according to skin smear positivity) to serve as a basis for Chemotherapy:*

	Paucibacillary Leprosy (PBL)	Multibacillary Leprosy (MBL)
	BI < 2	BI ≥ 2
Included types	Indeterminate Polar tuberculoid (TT) Border tuberculoid (BT)	Polar lepromatous (LL) Borderline lepromatous (BL) Mid-borderline (BB)
Multidrug therapy[Q] (MDT) in NLEP (Drugs)	Rifampicin 600 mg OAMS Dapsone 100 mg daily	Rifampicin 600 mg OAMS Dapsone 100 mg daily Clofazimine 300 mg OAMS, 50 mg daily
Treatment duration[Q]	6 months	12 months
Follow up[Q] (after treatment)	Annually for 2 yrs	Annually for 5 yrs

(*BI:* Bacteriological Index; OAMS: Once a month supervised)

Epidemiology of Leprosy

- *Description:* Chronic infectious disease caused by Mycobacterium leprae and affecting mainly peripheral nerves
  - Leprosy is a disease of 'high infectivity but low pathogenicity'
  - Attack rate of Leprosy among house-hold contacts: 4.4 - 12%
  - Youngest case of Leprosy in India: 2 ½ month infant[Q]
  - Leprosy is often known as a 'Social disease'
  - Is probably the oldest disease known to mankind[Q]
- *Mode of transmission of Leprosy:* [Q]
  - Droplet infection (MC[Q])
  - Contact transmission (Direct skin to skin or indirect with soil/fomites)
  - Breast milk from lepromatous mothers
  - Transplacental
  - Insect vectors
  - Tattooing needles
- *Diagnosis of leprosy under NLEP* is currently based on clinical grounds[Q]
  - *PBL:* 1 – 5 skin lesions
  - *MBL:* > 5 skin lesions

I *Diagnosis*
PBL: 1 – 5 skin lesions
MBL: > 5 skin lesions

Important Points of Leprosy

- *Level of Leprosy for declaring it as a Public Health Problem:* >1/10,000[Q]
- *Elimination Level of Leprosy:* <1/10,000[Q]
  - India eliminated Leprosy in December 2005[Q]
- *Goal for Leprosy under National Health Policy 2002:* Elimination by 2005
- Leprosy exhibits 'both cell mediated immunity (CMI) and humoral immunity'[Q]

I *Elimination Level of Leprosy:* <1/10,000

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Tests for Detecting Immunity in Leprosy

Tests of Cell Mediated Immunity[Q]	Tests of Humoral Immunity[Q]
Lepromin test	FLA – ABS Test
Lymphocyte transformation test	Monoclonal antibodies test
Leucocyte migration inhibition test	ELISA tests
	Radioimmuneassay

Lepromin Test

I Lepromin Test
Readings: After 48 hours and after 21 days

- Test of CMI in Leprosy[Q]
- Test: 0.1 ml Lepromin intradermal on inner aspect of forearm
- *Antigens used in Lepromin test:* [Q]
  - Dhamendra antigen (extensively used in India)
  - Mitsuda antigen
- *WHO recommended concentration of Dhamendra Antigen:* 1/16
- *Readings:* After 48 hours and after 21 days[Q]
- *Reactions in Lepromin test:*
  - *Early Reaction (FERNANDEZ REACTION[Q]):*
    - Read at 48 hours[Q]
    - Redness > 10 mm indicates +ve test
    - Indicates prior exposure or infection
    - Delayed type of hypersensitivity[Q]
    - Induced by soluble components of leprosy bacilli
    - Superior to late reaction
    - Corresponds to Mantoux Reaction (TB)[Q]
  - Late Reaction (LATE MITSUDA REACTION[Q]):
    - Read at 21 days[Q]
    - Nodule > 5 mm diameter is +ve
    - Indicates cell mediated immunity[Q]
    - Induced by bacillary component of antigen
    - BCG vaccine can convert it from –ve to +ve
- *Value of Lepromin test:*
  - Is not a diagnostic test[Q]
  - *Uses of Lepromin test[Q]:*
    - Evaluation of CMI status of patients
    - Aid to confirm the classification of Leprosy
    - Estimation of prognosis of cases
  - *Drawbacks of Lepromin test as a diagnostic test:*
    - Positive in non-cases
    - Negative in lepromatous and near-lepromatous cases
- *Interpretation of Lepromin Test:*

I *Uses of Lepromin test:*
– Evaluation of CMI status
– Aid to confirm the classification
– Estimation of prognosis

Reaction	Interpretation
++ to +++	Tuberculoid Leprosy (TT)[Q]
+ to ++	Maculo-anaesthetic Leprosy (MA)
– or + or +	Intermediate Leprosy (I)
+ to ++	Borderline Tuberculoid Leprosy (BT)
+ or +	Borderline Borderline Leprosy (BB)
– or +	Borderline Lepromatous Leprosy (BL)
–	Lepromatous Leprosy (LL)

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Definitions under National Leprosy Elimination Program (NLEP)

- *Paucibacillary Leprosy (PBL):* 1 – 5 skin lesions and/or only one nerve involvement
- *Multibacillary Leprosy (MBL):* 6 or more skin lesions and/or more than one nerve involvement
- *Adequate treatment:* Patient has received 6 months of therapy in 9 months (for PBL) or 12 months of therapy within 18 months (for MBL) Q
- *Regular treatment:* Received MDT for two-thirds of total duration of therapy, i.e. 4 months for PBL (out of 6 months of duration of therapy) and 8 months for MBL (out of 12 months of duration of therapy)Q
- *Case:* Clinical signs of leprosy (with or without bacteriological confirmation of diagnosis) and who has not yet completed a full course of treatment with Multi-Drug Therapy (MDT)
- *Newly diagnosed case:* Diagnosed case who has not taken MDT in past
- *Defaulter:* A leprosy patient on MDT, who has not collected treatment for 12 consecutive monthsQ
- *Relapsed case:* A patient whose therapy was terminated successfully, completed adequately, who subsequently develops new signs and symptoms of disease. either during surveillance period or thereafter

I *Defaulter:* A leprosy patient on MDT, who has not collected treatment for 12 consecutive months

Leprosy is Not Amenable to EradicationQ

- Long and variable incubation period (Most important reason)Q
- Disputed modes of transmission
- Presence of sub-clinical cases and our inability to detect them
- Complicated spectrum of disease manifestations
- Failure of cell mediated immunity in lepromatous cases
- Bacterial resistance and persistence in the human body
- Absence of a vaccine
- Social and cultural taboos leading to concealment of disease
- Discovery of extra-human reservoir

HIV/AIDS

HIV Epidemiology

Route of transmission	% of total cases (India)	Efficiency of route
Sexual	87Q	0.01 – 1%Q
Blood and blood products	1Q	> 90%Q
Sharing needles/ syringes	2	0.3%
Mother to child transmission	5	3%

- *Causative organism:* Human immunodeficiency virus (HIV) [Human T-Lymphotropic virus – III (HTLV–III); Lymphadenopathy virus (LAP)]
  - *Chances of HIV transmission in presence of STDs:* Increases 8 – 10 timesQ
  - AIDS (Acquired Immunodeficiency Syndrome) is also known as 'Slim Disease'
- *Reservoir:* Cases and carriers
  - *Source:* Virus is in greatest concentration in blood, semen and CSF (lower concentrations in tear, saliva, breast milk, urine, cervical and vaginal secretions)
- *Basic modes of transmissionQ:*
  - Sexual (MC)
  - Blood and blood products
  - Needles/syringes
  - Mother to Child transmission (MTCT)

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I

MC Opportunistic Infection (OI) in AIDS
- World: Pneumocystis carinii pneumonia
- India: Tuberculosis

- *IP:* Few months to 10 years
- MC Opportunistic Infection (OI) in AIDS
  - *World:* Pneumocystis carinii pneumonia (PCP)
  - *India:* Tuberculosis (> Candida > PCP)
- *Epidemiological pattern of HIV epidemic in India:* Type 4 pattern [Epidemic starts from highest risk group (commercial sex workers, homosexuals, drug users) to bridge population (clients of sex workers, STD patients, migrant population, partners of drug users), and then to general population]

HIV Situation in India [2015]

I

Prevalence of HIV: 0.26%

- *Total no. of HIV cases:* Less than 2.12 million (Rank 3)
- *Prevalence of HIV:* 0.26%
- *Classification of states:*

Groups with states/ UTs	Criteria of prevalence in	
	High risk groups	Antenatal clinics
Group I (High Prevalence)Q: Maharashtra, Tamil Nadu, Andhra Pradesh, Karnataka, Manipur, Nagaland	> 5%	> 1%
Group II (Moderate Prevalence): Gujarat, Goa, Pondicherry	> 5%	< 1%
Group III (Low Prevalence): Remaining states & UTs	< 5%	< 1%

- *Categorization of Districts*:

District	CriteriaQ
A	>1% ANC/ PTCT prevalence anytime anywhere in last 3 years
B	<1% ANC/ PTCT prevalence everywhere in last 3 years PLUS >5% prevalence in any HRG (CSW/MSM/IDU/STD)
C	<1% ANC/ PTCT prevalence everywhere in last 3 years PLUS <5% in all STD clinic attendees/ HRG with known hotspots (Migrants/Truckers/Factory workers/ Tourists)
D	<1% ANC/ PTCT prevalence everywhere in last 3 years PLUS <5% in all STD clinic attendees/ HRG OR Poor HIV data with no known hotspots

(ANC Antenatal clinic; PTCT Parent to Child Transmission)

Age and Sex distribution of HIV/AIDS in India [2006]:

Distribution of HIV/AIDS cases	Cumulative cases
Age distribution	
0 – 14 years	5%
15 – 29 years	32%
30 – 44 yearsQ	56%
> 45 years	7%
Sex distribution	
Male	71%
Female	29%

- *First case of HIV/AIDS: 1986 (Chennai, Tamil Nadu)*Q
- *National AIDS Control Programme (NACP) launched:* 1987Q
- *National AIDS Prevention and Control Policy (NAPCP):* 2001

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Mother to Child Transmission (MTCT) of HIV

- *MTCT in developing countries (India):* 30%Q
- *MTCT in developed countries:* 20%
- `*Prevention of MTCT in India:*

Modality	Dose/ type	Reduction in MTCT by	Post-modality MTCT in India
Zidovudine	Mother: 300 mg BD from 36 wks POG + 300 mg 3h during delivery Child: 2mg /kg 6h × 6 wks	66%Q	10%
Nevirapine	Single oral dose Mother: 200 mg at labor onset Child: 2mg/ kgQ within 72 hrs of birthQ	50%Q	15%Q
Caesarean section	Elective CS	50%	15%

Triple ARV Prophylaxis for PMTCT of HIV (3TC+TDF+EFV) Q

- Description: New modality introduced under NACP for Prevention of Mother to Child Transmission of HIV in India
- Three drugs used in combination:

Clinical scenario	Regimen for prophylaxis
Those requiring ARV prophylaxis	TDF+3TC+EFV (FDC Single pill)Q Tenofovir 300 mg once daily plus Lamivudine 300 mg once daily plus Efavirenz 600 mg once daily
Those with prior exposure of NNRTI (NVP/EFV)	TDF+3TC+LPV/r Tenofovir 300 mg once daily plus Lamivudine 300 mg once daily plus Lopinavir/ Ritonavir 400/100 mg twice daily

- Duration of prophylaxis:
  - Start at 14 weeks POG
  - Continue through out pregnancy, delivery, lactation
  - End after 1 week of breast feeding cessation
- Breast feeding in Triple ARV prophylaxis:
  - Exclusive breast feeding: Continue for 0-6 months age
  - Breast feeding with complimentary feeding: Continue for 1 year or 2 years (those who had received Pediatric ART) age
- Infant diagnosis:
  - Repeat testing at 6 weeks age, 6 months, 12 months and 6 weeks after cessation of breast feeding
  - Confirmation of HIV status of all at 18 months age
- Post-partum Infant ARV prophylaxis: Nevirapine till 6 weeks age

New Post-Exposure Guidelines for HIV 2014-15 (Proposed)

- *Adolescents and Adults*:
  - *Preferred backbone regimen*: TDF + 3TC (or FTC)
  - *Preferred third drug*: LPV/r or ATV/r
  - *Alternate options*: RAL, DLV/r or EFV
- *Children less than 10 years old*:
  - *Preferred backbone regimen*: AZT + 3TC
  - *Alternate regimens*: ABC + 3TC or TDF + 3TC (or FTC)
  - *Preferred third drug*: LPV/r
  - *Alternate options according to age-appropriateness*: ATV/r, RAL, DRV, EFV, NVP)
- *Prescribing frequency*: 28 day prescription

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I *Antiretroviral (ARV) treatment started in AIDS if: CD4 count < 350*

I *Screening tests used: ELISA/ RAPID/SIMPLE Confirmatory diagnostic test used: Western Blot Assay (WBA)*

HIV/AIDS Situation sin World [2012]

- *Total no. of People Living with HIV/AIDS [PLHA]):* 34 million
- *HIV prevalence:* 0.8%
- *MC opportunistic Infection*: Pneumocystis carinii pneumonia[Q]
- *Antiretroviral (ARV) treatment started in AIDS if:* CD4 count < 350[Q]

National AIDS Control Programme, India

- *National AIDS Control Programme (NACP) launched:* 1987
- *Screening tests used:* ELISA/ RAPID/ SIMPLE (ERS)[Q]
- *Confirmatory diagnostic test used:* Western Blot Assay (WBA)[Q]

For further details Refer to Chapter 6, Theory

WHO Clinical Staging For HIV Infection (13 years or older)

- **Stage 1:** (*Performance scale 1:* Asymptomatic, normal activity)
  - Asymptomatic
  - Persistent generalized lymphadenopathy
- **Stage 2:** (*Performance scale 2:* Symptomatic, normal activity)
  - Weight loss <10% of body weight
  - Minor muco-cutaeous manifestations
  - Herpes zoster in last 5 years
  - Recurrent URTIs
- **Stage 3:** (*Performance scale 3:* Bed-ridden <50% days in last month)
  - Weight loss > 10% of body weight
  - Unexplained chronic diarrhea > 1 month
  - Unexplained prolonged fever > 1 month
  - Oral candidiasis (Thrush)
  - Oral hairy leucoplakia
  - Pulmonary TB
  - Severe bacterial infection
- **Stage 4:** *(Performance scale:* Bed-ridden > 50% days in last month)
  - HIV wasting syndrome (Weight loss > 10% + Chronic diarrhea + prolonged fever)
  - Pnemocystis carinii pneumonia
  - Toxoplasmosis of brain
  - Cryptosporiodosis with diarrhea, > 1 month
  - Cryptococcosis, extrapulmonary
  - CMV of organ (except liver, spleen, lymphnodes)
  - Herpes virus (mucocutaneous > 1 month or visceral)
  - Progressive multifocal leucoencephalopathy (PML)
  - Any disseminated endemic fungal infection
  - Candidiasis (Oesophagus, trachea, bronchi or lungs)
  - Atypical mycobacteria (disseminated)
  - Non- typhoid salmonella septicaemia
  - Extrapulmonary TB
  - Lymphoma
  - Kaposi's sarcoma
  - HIV encephalopathy

WHO Clinical Staging For HIV Infection (For children)

- **Stage 1:**
  - Asymptomatic
  - Persistent generalized lymphadenopathy
- **Stage 2**
  - Unexplained chronic diarrhea
  - Severe persistent or recurrent candidiasis (outside neonatal period)

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  - Weight loss or failure to thrive
  - Persistent fever
  - Recurrent severe bacterial infections
- **Stage 3**
  - AIDS–defining opportunistic infections
  - Severe failure to thrive
  - Progressive encephalopathy
  - Malignancy
  - Recurrent septicaemia or meningitis

3 by 5 Initiative[Q]

- Launched by WHO and UNAIDS on 1st Dec 2003
- *Target:* To provide antiretroviral treatment (ART) to 3 million people living with HIV/AIDS (PLHA) in developing countries by end of 2005
- *Ultimate goal:* To provide universal access to treatment for HIV/AIDS to all those who need it
- *Focus on:*
  - Simplified, standardized tool to deliver ART
  - New service to ensure an effective/reliable supply of medicines and diagnostics
  - Rapid identification, dissemination and application of new knowledge and successful strategy
  - Urgent sustained support to countries
  - Global leadership
  - Backed by strong partnership

STIS (OTHER THAN HIV)

Sexually Transmitted Infections (STIs)

Common sexually transmitted infections (STIs)[Q]*:*

STI	Causative agent
5 Classical STD's Syphilis Gonorrhoea Chanchroid LGV Donovanosis	 Treponema pallidum Neisseria gonorrhoeae Hemophilus ducreyi[Q] Chlamydia trachomatis Calymmatobacterium granulomatis[Q]
HIV/AIDS	Human immunodeficiency virus
Hepatitis A	Enterovirus 72 (Picornavirus)[Q]
Hepatitis B	Hepadnavirus (Dane's particle)
Hepatitis C	Hepacivirus
Hepatitis D	HDV
Genital and anal warts	Human Papilloma Virus[Q]
Scabies	Sarcoptes scabei[Q]
Pubic louse	Phthirus pubis
Trichomoniasis	Trichomonas vaginalis (MC in World)

I
5 Classical STD's —
Syphilis
Gonorrhoea
Chanchroid
LGV
Donovanosis

- *Other sexually transmitted agents include:*
  - Streptococcus group B[Q]
  - Campylobacter
  - Ureaplasma urealyticum
  - Entamoeba histolytica
  - Shigella
  - Human (beta) herpes virus 5
  - Candida albicans[Q]
  - Molluscum contagiosum
  - Mycoplasma hominis
  - Giardia lambia
  - Human (alpha) herpes virus 1, 2

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- *Incubation periods of STIs:*

STI	Incubation period[Q]
Syphilis[Q]	9 – 90 days
LGV[Q]	3 – 12 days
Donovanosis[Q]	3 – 21 days
Chancroid[Q]	3 – 5 days
Gonorrhoea[Q]	1 – 5 days
Molluscum contagiosum	14 – 50 days
HIV/ AIDS[Q]	Months – 10 years

Endemic Treponematoses

Disease	Causative agent	Mode of transmission	DOC
Pinta	Treponema carateum	Non venereal (direct contact)	Benzathine Penicillin G[Q]
Yaws	Treponema pertenue[Q]	Non venereal[Q] (direct contact with secretions from infectious lesions, fomites, insect vectors)	Benzathine Penicillin G[Q]
Endemic syphilis	Treponema pallidum	Non venereal	Benzathaine Penicillin G
Syphilis	Treponema pallidum	Venereal	Benzathaine Penicillin G

I Yaws Caused by: Treponema pertenue

Yaws/ Pian/ Bubas/ Framboesia

- *Causative agent:* Treponema pertenue[Q]
- *IP:* 3-5 days
- *Clinical features:*
  - *Early Yaws:* Mother Yaws[Q] followed by generalized eruption
  - *Late Yaws:* by end of 5 yrs
    - *Crab Yaws*[Q]*:* Lesions of soles and palms
    - *Gangosa*[Q]*:* Destructive lesions of soft palate, hard palate and nose
    - *Goundu*[Q]*:* osteo-periostitis of Superior maxillary bone[Q]
- Yaws has been declared eliminated from India in September 2006[Q]
- Man is the only known reservoir of Yaws[Q] (but no natural immunity)
- Yaws provide partial immunity to venereal syphilis
- *WHO recommended treatment policies for Yaws:*

Treatment policy	Recommended for type of area	Prevalence	Treatment given to
Total mass treatment	Hyperendemic	> 10 %	Entire population with cases
Juvenile mass treatment	Mesoendemic	5-10 %	All cases, all 0-15 yr children contacts
Selective mass treatment	Hypoendemic	< 5%	Cases, contacts of infectious cases

I Yaws has been declared eliminated from India in September 2006

- With decline of Yaws, emphasis of control strategy has shifted to 'surveillance & containment'
- *Epidemiologically Yaws is not vulnerable to eradication*[Q]*:*
  - cases are contagious for months or years after onset of symptoms
  - latent cases occur frequently (treponemes persist in CSF & lymph nodes even after cure)
  - immunity acquired is only partial
  - disease is not fatal
  - accurate diagnosis by non- medical personnel is a problem
  - no vaccine available for Yaws

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Syndromic Approach (Simplified STD Treatment)

- *Concept:* The traditional method of diagnosing STDs is by laboratory tests, which are very often unavailable or too expensive
  - Syndromic Management of STDs has been recommended by WHO since 1990 which is 'based on symptoms and clinical signs'Q
- *Importance of Syndromic Approach:* Through this approach, a health worker at the most peripheral level without using laboratory support, can diagnose reproductive infections and accordingly prescribe treatment or advise referral of the patient.
- *Main features of Syndromic Approach:*
  - classification of the main causative pathogens by the clinical syndromes they produce
  - use of flow charts to manage a particular syndrome
  - treatment for all important causes of the syndrome
  - notification and treatment of sex partners
  - no expensive laboratory procedures required
- *Advantages of Syndromic Approach:*
  - permits STD treatment without costly laboratory tests
  - offers accessibility, immediate, effective and efficient treatment
- *Disadvantage of Syndromic Approach:*
  - over-treatment in some patients (esp. in vaginal discharge)
- *Syndromes in Syndromic ApproachQ:*
  - *Urethral discharge:* Is usually due to gonococcal or non-gonococcal (chlamydial) urethritis
  - *Vaginal discharge:* Is usually due to gonococcal or non-gonococcal cervicitis or vaginitis (trichomoniais, candidiasis or bacterial vaginosis). Speculum examination for establishing diagnosis
  - *Genital ulcer:* Due to syphilis, chanchroid, LGV, granuloma inguinale or herpes infection
  - *Inguinal swelling (Bubo):* Usually due to LGV
  - Lower abdominal pain/PID

I Syndromic Management of STDs has been 'based on symptoms and clinical signs'

STD Colour coded kits

KitQ	ColourQ	SyndromeQ	Contents
1	Grey	Urethral/Anorectal/ Cervical discharge/ SS#	Azithromycin, Cefixime
2	Green	Vaginal discharge	Secnidazole, Fluconazole
3	White	Genito-ulcerative disease (Non-herpetic)	Azithromycin, Benzathain penicillin
4	Blue	Genito-ulcerative disease (Non-herpetic)*	Azithromycin, Doxycycline
5	Red	Genito-ulcerative disease (Herpetic)	Acyclovir
6	Yellow	Lower abdominal pain	Cefixime, Metronidazole, Doxycycline
7	Black	Inguinal bubo	Azithromycin, Doxycycline

(*For patients allergic to penicillin, #SS Scrotal swelling)

Case Detection in a STD Control Programme

- Screening
- *Contact tracing:* Sexual partners of diagnosed patients are identified, located, investigated and treated
  - Is one of the best methods of controlling the spread of infection
  - Is relatively expensive (in low prevalence)
  - Key to success is patient himself (who must disclose all sexual contacts voluntarily)
- *Cluster testing:* Screening of all persons of either sex, who move in the same socio-sexual environment of the patientQ
  - It almost doubles the number of cases found

I Case Detection in a STD Control Programme
- *Screening*
- *Contact tracing*
- *Cluster testing*

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Suraksha Clinic

- *Description:* Chain of RTI/STI clinics to provide reproductive and sexual health services[Q]
- *Established by:* National AIDS Control Program, NACO
- *Purpose:* Control of STI/RTIs viz., HIV, Syphilis, Gonorrhea, Herpes, Chlamydia, Genital warts
- *Facilities[Q]:*
  - Blood sample testing
  - Counseling
  - Syndromic case management (RTI/STI/RPR kits)

MISCELLANEOUS (COMMUNICABLE DISEASES)

Zoonoses

- *Zoonoses:* An infection or infectious disease transmissible under natural conditions from vertebrate animals to man
- Classification of Zoonoses based on direction of transmission:
  - *Anthropozoonoses[Q]:* Infections transmitted from animals (zoo) to man (anthro):
    - Rabies[Q]
    - Anthrax[Q]
    - Trichinosis
    - Plague[Q]
    - Hydatid disease[Q]
  - *Zooanthroponoses[Q]:* Infections transmitted from man (anthro) to animals (zoo):
    - Human TB in cattle[Q]
  - *Amphixenosis:* Infections transmitted in either direction between animals and man:
    - Trypanosoma cruzi
    - Schistosoma japonicum

Food Poisoning

Incubation period of food poisoning:

Food poisoning	Incubation period
Salmonella[Q]	12 – 24 hours
Staphylococcal[Q]	1 – 6 hours
Botulism	12 – 36 hours
Cl. perfirengens	6 – 24 hours
B. cereus (emetic form)	1 – 6 hours
B. cereus (diarrhoel form)	12 – 24 hours

- *Staphylococcal Food Poisoning:*
  - *Agent:* Enterotoxins of Staphylococcus aureus
  - Toxins formed at 35° – 37° C
  - Toxins are relatively heat stable and resist boiling for 30 min or more
  - *Incubation period:* 1 – 6 hours
  - IP is short because of 'preformed toxin'
  - *Mechanism of food poisoning:* Intra-dietetic toxins (ingestion of toxins pre-formed in food, in which bacteria have grown)
- *Botulism food poisoning:*
  - *Agent:* Clostridium botulinum type A, B, E
  - *IP:* 12 – 36 hours
  - *Mechanism of food poisoning:* Intra-dietetic toxins

Incubation period: 1 – 6 hours for staph FP

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  - *Prominent symtoms:* GIT SYMPOTOMS ARE SLIGHT[Q]
    - Dysphagia[Q]
    - Diplopia[Q]
    - Dysarthria[Q]
  - *Prophylaxis:* 50,000 – 100,000 units anti-toxin
  - *Treatment:* Guanidine hydrochloride
- *Clostridium perfirengens food poisoning:*
  - *Agent:* Clostridium perfirengens (welchii)
  - *IP:* 6 – 24 hours
  - Rapid recovery with no deaths
- *Bacillus cereus food poisoning:*
  - *Agent:* Bacillus cereus
  - *IP:* 1 – 6 hours (emetic form), 12 – 24 hours (diarrhoel form)

I *Prominent symtoms* in Botulism FP: GIT SYMPOTOMS ARE SLIGHT
– Dysphagia
– Diplopia
– Dysarthria

Brucellosis

- *Also known as:* Undulant fever[Q], Malta fever, Mediterranean fever
- *Causative agent:* Brucella species
  - *Brucella melitensis:* Most virulent and invasive species[Q]
  - *Brucella abortus:* Less virulent, primarily affect cattle
  - *Brucella suis:* Intermediate virulence, infects pigs
  - *Brucella canis:* Parasite of dogs
- *Reservoir: Cattle, sheep, goats, swine, buffaloes, horses, dogs*[Q]
- Modes of transmission[Q]:
  - *Contact infection:* Direct contact with infected tissues, blood, urine, vaginal discharge, aborted fetuses and ESPECIALLY placenta[Q]
  - *Food-borne infections:* Raw milk/ dairy products, fresh raw vegetables, water
  - Air-borne infection: aerosol
- *Incubation period:* usually 1 – 3 weeks
- *Most striking feature:* Severity of illness and absence of clinical illness
- *Most rational approach for prevention:* Control and eradication of infection from animal reservoirs
- O*nly satisfactory solution aimed at eradication:* Slaughter of infected animals, with full compensation paid to farmers
- *Antibiotic of choice:* Tetracycline 500 mg QID X 3 weeks[Q]

I *Antibiotic of choice:* Tetracycline for Brucellosis

Crimean Congo Fever (CCF)

- *Type of disease:* Zoonosis of domestic/wild animals which may affect human beings
- *Causative agent:* Nairovirus[Q] (Bunyavirus)
- *Vector:* Hyalomma ticks[Q] (Hard ticks)
- *Incubation period:* 1-13 days (Median 5-6 days)
- *Case fatality rate:* 30%[Q]
- *Drug of choice:* Ribavirin[Q]
- *Situation in India:* Exotic-Epidemic in India (Gujarat, December 2010)

I *Vector:* Hyalomma ticks[Q] (Hard ticks)
Drug of choice: Ribavirin

Amoebiasis

- *Causative agent:* Entamoeba histolytica (7 pathogenic + 11 non-pathogenic zymodymes)
- Amoebiasis affects 15% of Indian population
- *Source of infection:* Cysts (NOT trophozoites)
- *Reservoir:* Man
- *Period of communicability:* Upto years (till cysts excreted)
- *Modes of transmission:*[Q]
  - Faecal-oral
  - Sexual (Oro-rectal in homosexuals)
  - Vectors (Flies, Cockroaches, rodents)
- I*ncubation period:* 2-4 weeks

I *Modes of transmission of Amoebiasis:*
Faecal-oral
Sexual
Vectors

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- *Diagnosis:*
  - *Readily diagnostic test:* Trophozoites containing RBCs in freshly passed mucus per rectum
  - *Most sensitive serological test:* Indirect hemagglutination test
- *Treatment:*
  - *Symptomatic:* Metronidazole[Q]
  - *Asymptomatic:* Diodohydroxyquin

EMERGING AND RE-EMERGING DISEASES

NIPAH Virus

- *Genus*: Henapi virus
- *Transmission in India*:
  - *Occurrence*: West Bengal
  - *Route*: Consumption of fruits contaminated with bats (Pteropus: 'Flying foxes') secretions
- *Clinical presentation*: Encephalitis
- *Case fatality rate*: 50%
- *Vaccine*: NONE for humans
- *Treatment*: Intensive supportive care

SARS Severe Acute Respiratory Syndrome

- *Causative agent:* Coronavirus[Q]
- *Origin:* China, 2002
  - Total cases: 8094
  - Total deaths: 774
- *Route of transmission:* Air droplets
- *Vaccine:* None
- *Treatment:*
  - Antipyretics
  - Supplemental Oxygen
  - Mechanical ventilation

H7N9 Avian Influenza

- *Occurrence:* First time among humans
- *Origin:* March 2013, China[Q]
- *Incubation period:* 3.1 days[Q]
- *Route of transmission:* Air droplets
- *Case fatality rate:* 33%[Q]
- *Vaccine:* NONE
- *Treatment:* Neuraminidase inhibitors
  - Oseltamivir
  - Zanamivir

MERS-CoV Middle East Respiratory Syndrome - Corona Virus

- *Cause:* Betacoronavirus (lineage C)[Q]
- *Origin:* Saudi Arabia, 2012[Q]
- *Incubation period:* 2-14 days[Q]
- *Route of transmission:*
  - Air droplets
  - Camel milk
  - Camel meat

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- *Source:* Camels
- *Reservoir:* Bats
- *Case fatality rate:* 30%
- *Treatment:* None

Ebola Virus Disease[Q]

- *Current outbreak:* South Africa (Sierra Leone, Guinea, Liberia, Nigeria)[Q]
- *Incubation period:* 2-21 days
- *Route of transmission[Q]:*
  - Body fluids (including semen, breast milk)
- *Source:* Cases
- *Reservoir:* Bats[Q]
- *Case fatality rate[Q]:* 40%
- *Treatment:*
  - Rehydration
  - Symptomatic

H5N6 Avian Influenza

- First detected: 2015, China
- A subtype of the species Influenza A virus (sometimes called bird flu virus)
- Four known cases, three fatal, have occurred in humans

Other New Infections

- H10N8
- H5N8
- H5N3
- Zika

CORONARY HEART DISEASE

Prudent Diet (Dietary Goals)

- *Description*: Dietary modification is the principal preventive strategy for prevention of CHD
- *WHO recommended changes*: [GOAL[Q] : Cholesterol/HDL Ratio < 3.5]
  - Reduction of fat intake to < 20 – 30 % of total energy intake[Q]
  - Consumption of saturated fats < 7 % of total energy intake[Q]
  - Reduction in dietary cholesterol to < 200 mg per day
  - Increase in complex carbohydrate consumption
  - Reduction of salt intake to < 5 gms per day[Q]
  - Avoidance of alcohol consumption

I

GOAL[Q] of Prudent Diet: Cholesterol/HDL Ratio < 3.5

Coronary Heart Disease

- *Coronary Heart Disease (CHD) or Ischemic Heart Disease (IHD):* Impairment of heart function due to inadequate flow to heart as compared to its needs, caused by obstructive changes in coronary circulation to heart
- *CHD manifests as:*
  - Angina pectoris
  - Myocardial infarction
  - Irregularities of the heart
  - Cardiac failure
  - Sudden death
- *Pattern of CHD in India[Q]:*
  - Occurs a decade earlier then with age incidence in developed nations

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- Peak period is 51 – 60 years age
- Males affected more than females
- Hypertension and Diabetes mellitus account for > 40% cases
- Heavy smoking is responsible for a large no. of cases

- *Risk factors of CHD:*

Non-modifiable risk factors[Q]	Modifiable risk factors[Q]
Age	Cigarette smoking
Sex	High blood pressure
Family history	Elevated serum cholesterol
Genetic factors	Diabetes
Personality (Type A) (?)	Obesity
Sedentary habits	
Stress	

Smoking as a Risk Factor for CHD

- Modifiable major risk factor
- 25% of CHD deaths under 65 years age
- Causes Sudden death from CHD, especially in men < 50 years age
- Degree of risk of developing CHD is directly related to no. of cigarettes smoked per day[Q]
- Filter cigarettes are probably not protective[Q]
- Synergistic with other risk factors like hypertension and hypercholesterolemia[Q]
- Risk of death from CHD decreases on cessation of smoking
  - Risk declines substantially within 1 year of cessation
  - After 10 – 20 years, it is same as that of non-smokers[Q]
  - Those with history of myocardial infarction – risk of fatal occurrence reduced by 50%

I *Most direct association with CHD:* LDL cholesterol

Important Facts of CHD

- *Single most useful test for identifying individuals at high risk of CHD:* Blood pressure[Q]
  - Systolic BP better predictor of CHD than Diastolic BP[Q]
- *Most direct association with CHD:* LDL cholesterol – Cholesterol/ HDL ratio < 3.5
  - HDL cholesterol > 30 mg/ dl
- *Better predictors of CHD:* Apolipoprotein A–I and Apolipoprotein B[Q]
- *Alcohol intake as an independent risk factor for CHD:* > 75 grams per day
- *Mean serum cholesterol level associated with high risk of CHD:* >200 mg/dl[Q]
  - Threshold level: 220 mg/dl is protective
- *Protective for CHD:* HDL cholesterol (>30 mg/dl)[Q]
- *Clinical goal of CHD prevention:* Cholesterol/HDL ratio <3.5[Q]

I *Mean serum cholesterol level associated with high risk of CHD:* >200 mg/dl
Protective for CHD: HDL cholesterol (>30 mg/dl)

HYPERTENSION

- Hypertension (HT) is the MC cardiovascular disorder[Q]
- *Single most useful test to identify high risk of CHD:* Blood Pressure[Q]
- Systolic BP is a better predictor of CHD than diastolic BP
- *Prevalence of HT in India (1977-78):*

I Systolic BP is a better predictor of CHD than diastolic BP

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	Males	Females
Urban	59.9 per 1000	69.9 per 1000
Rural	35.5 per 1000	35.9 per 1000

- *Population strategy for prevention of Hypertension:* Is primary level of prevention
  - Nutrition (Reduction of salt intake to < 5 grams a day, moderate fat intake, avoidance of alcohol intake, restriction of energy intake as per body needs)
  - Weight reduction (BMI <25)
  - Exercise promotion
  - Behavioural changes (reduction of stress and smoking, doing yoga and meditation)
  - Health education
  - Self care
- *Rule of Halves*Q*:* Hypertension is an 'Iceberg disease'. Only about half of hypertensive subjects in general population of most of the developed countries are aware of condition, only half of those aware of the problem were being treated and only half of those treated were considered adequately treated

I

*Rule of Halves*Q*:* Hypertension is an 'Iceberg disease'

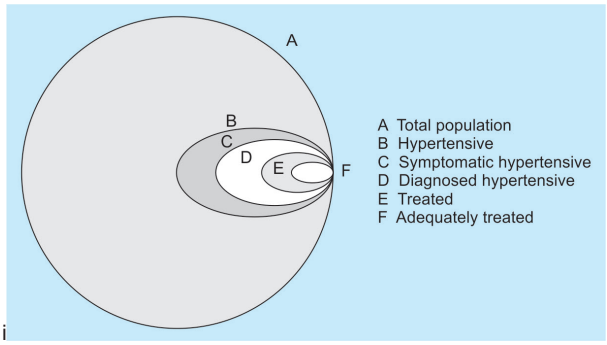

Figure: Rule of Halves

- *Tracking of Blood Pressure*Q*:* If BP of individuals were followed up over a period of years from early childhood into adult life, then those having high BP would continue into same 'track' as adults
  - Low BP tends to remain low and high BP tends to become higher as individuals grow older

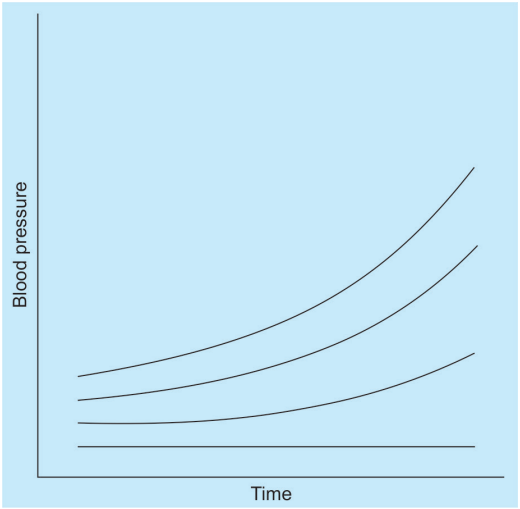

Figure: Tracking of blood pressure

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- *Goal of population strategy (Primary prevention) for HT control:* To shift the community distribution of BP towards lower levels or 'biological normality'
- *Recommended salt intake to prevent HT:* < 5 gm per day

DIABETES MELLITUS

- *Evidence of Life style factors and risk of Diabetes:*

Evidence	Decreased risk	Increased risk
Convincing	Voluntary weight loss Physical activity	Overweight, obesity Abdominal obesity Physical inactivity Maternal diabetes
Probable	Non-starch polysaccharide	Saturated fats IUGR
Possible	n-3 fatty acids Low glycemic index foods Exclusive breast feeding	Total fat intake Trans fatty acids
Insufficient	Vitamin E Chromium Magnesium Moderate alcohol	Excess alcohol

- *WHO Diagnostic Criteria:*

Diabetes	
Fasting plasma glucose	> 7.0 mmol/L (126 mg/dL)
2-hour plasma glucose	> 11.1 mmol/L (200 mg/dL)
Impaired Glucose Tolerance	
Fasting plasma glucose	< 7.0 mmol/L (126 mg/dL)
2-hour plasma glucose	7.8-11.1 mmol/L (140-200 mg/dL)
Impaired Fasting Glucose	
Fasting plasma glucose	6.1-6.9 mmol/L (110-125 mg/dL)
2-hour plasma glucose	< 7.8 mmol/L (140 mg/dL)

GLYCAEMIC INDEX

- *Definition*: Area under the 2-hour glucose response curve (AUC)
- *Low glycaemic index foods*: Less readily digestible and lower absorption of sugar
- *Classification of Glycaemic Index (GI)*:

Classification	GI range	Examples
Low GI	≤ 55	Most fruits and vegetables (EXCEPT potato/ water-melon/ sweet potato), Whole grains, Beans, Pasta, Lentils
Medium GI	56 – 69	Sucrose, Basmati rice, Brown rice
High GI	≥ 70	Corn flakes, Baked potato, White bread, Candy bar, Syrupy food, Jasmine rice

RHEUMATIC FEVER (RF)

- *Causative agent:* Group A beta hemolytic streptococci[Q]
  - Serotype M type 5 has highest 'rheumatogenic potential'[Q]
  - Recently Coxsackie virus B4 has been suggested as a 'causative factor' & Streptococcus acting as a 'conditioning agent'

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- RF is a disease of childhood & adolescence (5 – 15 yrs) affecting both sexes equally
- *RF is not a communicable disease:* but it results from a communicable disease (streptococcal pharyngitis)
- *MC cause of Heart disease in 5-30 yrs age group (globally)*[Q]*:* RF
- *Prevalence of RHD in India:* 5-7 per 1000 in 5 – 15 yrs age group[Q]
  - RF occurs in 1 – 3 % of Streptococcal infection
- *Eradication of Grp A Streptococcus is not possible:* Due to high carrier rate
- *MC cardiac lesion seen in RF:*
  - *In children:* Mitral regurgitation[Q]
  - *In adults:* Mitral stenosis[Q]
- *MC ECG finding in RF:* First degree AV block[Q]
- *Diagnosis of RF is by employing Revised Jones criteria*[Q]*:*

I

Prevalence of RHD in India: 5-7 per 1000 in 5 – 15 yrs age group
MC cardiac lesion seen in RF:
– *In children:* Mitral regurgitation[Q]
– *In adults:* Mitral stenosis
Diagnosis of RF is by employing Revised Jones criteria

Diagnostic categories	Criteria
Primary episode of RF	2M or 1M + 2m plus evidence of preceding group A Streptococcal infection
Recurrent attack of RF (in a patient without established RHD)	2M or 1M + 2m plus evidence of preceding group A Streptococcal infection
Recurrent attack of RF (in a patient with established RHD)	2M plus evidence of preceding group A Streptococcal infection
Rheumatic Chorea Insidious onset rheumatic carditis	Other M manifestations or evidence of Streptococcal infection not required
Chronic valvular lesions of RHD	Do not require any other criteria
Major manifestations (M)[Q] (Pneumonic : **JONES** or CANCER)	**J**oints: Migratory polyarthritis **O** shape of heart: Carditis **N**odules (Subcutaneous) **E**rythema marginatum **S**yndenham's Chorea
Minor manifestations (m)	Clinical: Fever, polyarthralgia Laboratory: elevated acute phase reactants (ESR, CRP, TLC)
Supporting evidence of a preceding streptococcal within the last 45 days	ECG: Prolonged PR interval[Q] Elevated or rising ASO Positive throat culture Rapid antigen test for Grp A Streptococci Recent Scarlet fever

- *Prevention of RF with Benzathine benzyl penicillin*[Q]*:*

Type of prevention	Adults	Children	Remarks
Primary	1.2 million units	600,000 units	Single dose intramuscular
Secondary	1.2 million units	600,000 units	3 weekly intervals for 5 yrs or till 18 yrs age (whichever is later)

- Oral penicillin (Penicillin V or G) X 10 days is the 'least expensive method' of giving penicillin to eradicate Streptococci from throat
- Secondary prevention for patients with carditis: Continue for 10 yrs after the last attack or atleast until 25 yrs age (whichever is longer)

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CANCERS

- *Incidence of Total Cancers in World:* (in Reducing order)

Total cancers	Total cancers - Males	Total cancers - Females
Lung cancer	Lung cancer	Breast cancer
Breast cancer	Prostate cancer	Colorectal cancer
Colorectal cancer	Colorectal cancer	Lung cancer
Prostate cancer	Stomach cancer	Cervix-uteri cancer
Stomach cancer	Liver cancer	Stomach cancer

- *Mortality of Total Cancers in World:* (in Reducing order)

Total cancers	Total cancers - Males	Total cancers - Females
Lung cancer	Lung cancer	Breast cancer
Liver cancer	Liver cancer	Lung cancer
Stomach cancer	Stomach cancer	Colorectal cancer
Colorectal cancer	Colorectal cancer	Cervix-uteri cancer
Breast cancer	Prostate cancer	Stomach cancer

- *Incidence of Total Cancers in India:* (in Reducing order)

Total cancers	Total cancers - Males	Total cancers - Females
Breast cancer	Lip, Oral cavity cancer	Breast cancer
Cervix-uteri cancer	Lung cancer	Cervix-uteri
Lip, Oral cavity cancer	Stomach cancer	Colorectal cancer
Lung cancer	Colorectal cancer	Ovary cancer
Colorectal cancer	Other pharynx cancer	Lip, Oral cavity cancer

- *Mortality of Total Cancers in India:* (in Reducing order)

Total cancers	Total cancers - Males	Total cancers - Females
Breast cancer	Lung cancer	Breast cancer
Cervix-uteri cancer	Stomach cancer	Cervix-uteri cancer
Lung cancer	Lip, Oral cavity cancer	Colorectal cancer
Stomach cancer	Colorectal cancer	Ovary cancer
Lip, Oral cavity cancer	Other pharynx cancer	Stomach cancer

- *Age standardized rate of new cancer cases in World*: 182 per 100,000 persons per year
- *Age standardized death rate of cancer cases in World*: 102 per 100, 000 persons per year
- *Age standardized rate of new cancer cases in India*: 94 per 100, 000 persons per year
- *Age standardized death rate of cancer cases in India*: 64 per 100, 000 persons per year

OBESITY

Criteria for Assessment of Obesity

- Body Mass Index (Quetelet's Index[Q]):

$$\text{BMI} = \frac{\text{Weight (Kg)}}{\text{Height}^2\text{(m)}^2}$$

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$$\text{BMI} = \frac{\text{Weight (Kg)}}{\text{Height}^2\text{(m)}^2}$$

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Classification of adults according to BMI:

Classification	BMI		
	Global population[Q]	Asian population	Indian population[Q]
Underweight	< 18.5	< 18.5	< 18.5
Normal BMI	18.5-24.99	18.5-22.99	18.5-22.99
Overweight	25-29.99	23-26.99	23-24.99
Obesity	≥ 30.0	≥ 27.0	≥ 25.0

Classification of obesity based on BMI[Q]:

Classification	BMI
Pre-obese (overweight)	25.0-29.99
Obesity Grade I	30.0- 34.99
Obesity Grade II	35.0-39.99
Obesity Grade III	≥ 40.0

Classification of underweight based on BMI:

Classification	BMI
Grade I Underweight	17.0-18.49
Grade II Underweight	16.0-16.99
Grade III Underweight	< 16.0

- *Ponderal index[Q]:*

$$PI = \frac{\text{height(cm)}}{3\sqrt{\text{body weight (kg)}}}$$

- *Broca index[Q]:*

Ideal weight = Height (cms) – 100

- *Lorentz formula:*

$$LF = \text{Ht (cm)} - 100 - \frac{\text{Ht(cm)} - 150}{2\,(\text{women}) \text{ or } 4\,(\text{men})}$$

- *Corpulence index* (normal ≤ 1.2)[Q]:

$$CI = \frac{\text{Actual weight}}{\text{Desirable weight}}$$

- *Skin fold thickness (SFT):*
  - Rapid & non-invasive method of fat assessment
  - 'Herpenden skin callipers' are good for estimation of SFT[Q]
  - *Main drawback:* Poor repeatability (Poor precision)
  - *Measurement at 4 sites:* Mid-triceps, biceps, sub-scapular, supra-iliac regions
    - Sum ≥ 50 mm in girls indicate obesity
    - Sum ≥ 40 mm in boys indicate obesity
  - *Single best measurement site of skin fold thickness:* Mid triceps[Q]
    - 18 mm in boys indicate obesity
    - 32 mm in girls indicate obesity
- *Waist circumference (WC) & waist: hip ratio* (WHR):
  - Good predictor of risk of cardiovascular diseases
  - High WHR indicates abdominal fat accumulation
    - WHR > 1.0 in men indicate obesity[Q]
    - WHR > 0.85 in women indicate obesity[Q]

I *Single best measurement site of skin fold thickness:* Mid triceps

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- Cut-offs for waist circumference in India:

Populations	Cut-off for WC[Q]
Indian	
Males	90 cm
Females	80 cm
Global	
Males	102 cm
Females	88 cm

I WHO has declared WHtR as 'best indicator of cardiovascular risk'

- *Waist:* Height Ratio (WHtR) [Q]:
  - WHO has declared WHtR as 'best indicator of cardiovascular risk'
  - WHtR is 'age and sex independent'
  - Cut-off for WHtR: 0.5
- *Other indicators:*
  - Total body water
  - Total body potassium
  - Body density
- Waist Height ratio (WHtR) [NEW INDICATOR OF CV RISK by WHO]
  - BEST indicator of cardiovascular risk
  - Age-independent
  - Sex independent
  - CV risk increase if WHtR >0.5

Weight Control Measures

- *Dietary changes:*
  - Reduce proportions of carbohydrates and fats (energy dense foods)
  - Increase fibre consumption
  - Ensure adequate levels of essential nutrients
- Increased physical activity
- *Others:*
  - Drugs
  - Surgical treatment
  - Health education

BLINDNESS

Blindness Situation

	World	India (NPCB, India)
Blindness	'visual acuity of <3/60 in better eye with best possible correction'	'visual acuity of <6/60 in better eye with best possible correction'
Prevalence	0.6% [2002]	1.05% [2006 – 07]
Causes	Cataract (48%) – MCC[Q] Glaucoma (12%) Uveitis (10%) ARMD Trachoma Corneal opacity Corneal opacity Others	Cataract – MCC[Q] Refractive Error Glaucoma Posterior segment pathology Corneal opacity Other causes

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Trends of Blindness in India

Year of survey	Prevalence of blindness
1971 – 74 (ICMR)	1.38%
1986 – 89 (NPCB)	1.49%Q
2006 – 07	1.05%
Goal by 2010	0.5%Q
Goal by 2020	0.3%Q

Definitions of Blindness

- WHO defines Blindness as 'visual acuity of <3/60 in better eye with best possible correction'Q
- National Programme for Control of Blindness (NPCB), India defines Blindness as 'visual acuity of <6/60 in better eye with best possible correction'Q
- American Medical Association definition of blindness: 'Central visual acuity of 20/200 or less in the better eye with corrective glasses'Q (or central visual acuity of more than 20/200 if there is a visual field defect in which the peripheral field is contracted to such an extent that the widest diameter of the visual field subtends an angular distance less than 20 degrees in the better eye)

I
- WHO defines Blindness as 'visual acuity of <3/60
- National Programme for Control of Blindness (NPCB), India defines Blindness as 'visual acuity of <6/60

WHO and NPCB Definitions

WHO – ICD	Visual Acuity	NPCB, India
Low Vision		
Category 1	<6/18 – 6/60	Low VisionQ
Category 2	<6/60 – 3/60	Economic BlindnessQ
Blindness		
Category 3	<3/60 – 1/60	Social BlindnessQ
Category 4	<1/60 – PL+	Manifest Blindness
Category 5	PL–	Absolute Blindness

(PL+: Perception of Light; PL–: No perception of light)

- *Revised Categories of Visual Impairment:*

Category	VA less than	VA equal or better than
0: Mild/ No visual impairment		6/18
1: Moderate visual impairment	6/18	6/60
2: Severe visual impairment	6/60	3/60
3: Blindness	3/60	1/60
4: Blindness	1/60	Light perception
5: Blindness	No light perception	No light perception
9	Undetermined/ Unspecified	Undetermined/Unspecified

Low Vision

- *Low Vision (Visual Acuity < 6/18 – 6/60):* Is an important cause of sub-optimal visual functioning.
- *Major causes of Low Vision in India:* (are similar to causes of blindness)
  - Cataract (77%) – MCC of Low Vision in IndiaQ
  - Refractive Error (19%)
  - Central corneal opacity
  - Pterygium
  - Peripheral corneal opacity
  - Other causes

I
Cataract (77%) – MCC of Low Vision in India

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Vision 2020

I *Vision 2020– The Right To Sight:* to reduce avoidable (preventable and curable) blindness by 2020

- *Vision 2020– The Right To Sight:* A global initiative by WHO and International NGOs to reduce avoidable (preventable and curable) blindness by 2020Q
- *Aim of Vision 2020:* To reduce the current projection of 75 million blind people by the year 2020 to a target of 25 million
- Vision 2020 will be implemented as '4 five-year plans', starting in 2000, 2005, 2010 and 2015 respectively

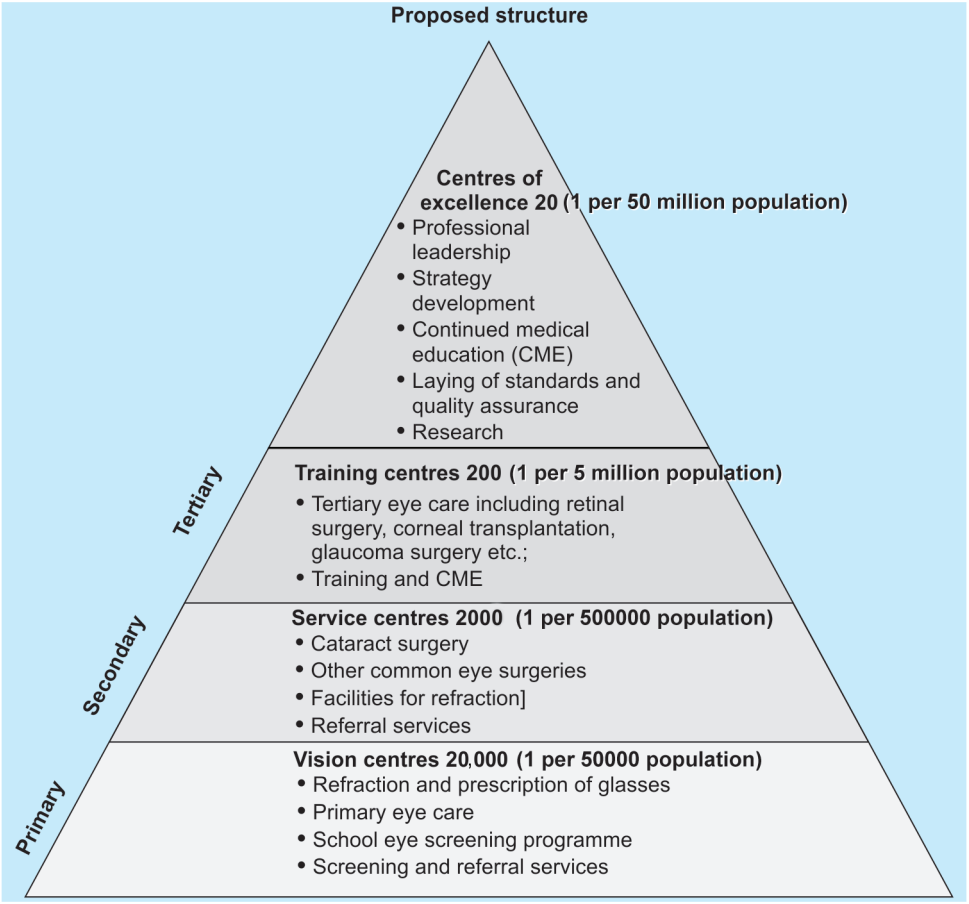
Proposed structure
Centres of excellence 20 (1 per 50 million population)
• Professional leadership
• Strategy development
• Continued medical education (CME)
• Laying of standards and quality assurance
• Research
Tertiary
Training centres 200 (1 per 5 million population)
• Tertiary eye care including retinal surgery, corneal transplantation, glaucoma surgery etc.;
• Training and CME
Secondary
Service centres 2000 (1 per 500000 population)
• Cataract surgery
• Other common eye surgeries
• Facilities for refraction]
• Referral services
Primary
Vision centres 20,000 (1 per 50000 population)
• Refraction and prescription of glasses
• Primary eye care
• School eye screening programme
• Screening and referral services

Figure: Proposed structure for vision 2020 : The right to sight

Global Vision 2020 (5 diseases[Q])	Indian Vision 2020 (7 diseases[Q])
Cataract	Cataract
Refractive errors and low vision	Refractive errors and low vision
Childhood blindness	Childhood blindness
Trachoma	Trachoma (Focal)
Onchocerciasis	Glaucoma
	Diabetic retinopathy
	Corneal blindness

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- *Basic Strategies Under Vision 2020:*
  - Disease prevention and control
  - Training of personnel
  - Strengthening the existing eye care infrastructure
  - Use of appropriate and affordable technology
  - Mobilization of resources
- *Recommended human resources and service facilities for Indian Vision 2020:*

STROKE (APOPLEXY)

- *WHO definition:* Rapidly developing clinical signs of local (or global) cerebral dysfunction, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin
  - 24 hour threshold EXCLUDES transient ischemic attacks (TIA)
- *Causes of stroke:*
  - Cerebral thrombosis (MCC of stroke or apoplexy[Q])
  - Cerebral hemorrhage
  - Subarachnoid hemorrhage
  - Cerebral embolism

MISCELLANEOUS (NON-COMMUNICABLE DISEASES)

Prevention and Control of Non-Communicable Diseases (NCDs)

- *Population strategy:*
  - Focus on control of underlying causes (riak factors) in whole populations, 'not merely by individuals'
  - *Principle:* Small changes in risk factor levels in total populations can achieve the biggest reduction in mortality, thus aim should be 'to shift the whole curve or risk factors towards biological normality'
  - *Specific interventions/ Dietary changes:*
    (PRUDENT DIET- DIETARY GOALS[Q]):
  - Primordial prevention
- *High risk strategy:*
  - *Identifying risk:* By using simple tests for blood pressure, serum cholesterol measurement
  - *Specific advice:* To those identified at high risk
- *Secondary prevention:*
  - *Aim:* to prevent reoccurrence and progression of NCDs

WHO STEP wise Approach[Q]

- *STEP wise approach to Surveillance (STEPS):* Is a simple, standardized method by WHO for surveillance
- *Is of two types:*
  - STEP wise approach to chronic disease risk factor surveillance
  - STEP wise approach to Stroke surveillance
- *Comprises of 3 steps:*

STEPS	Core	Expanded
STEP 1[Q] Behavioural measurements	Tobacco use Alcohol consumption Diet Physical activity History of raised BP History of diabetes	Tobacco use Alcohol consumption Diet Physical activity History of raised BP History of diabetes

Contd...

I STEP wise approach to chronic disease risk factor surveillance

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Contd...

STEP 2[Q]	Height & weight	Hip circumference & Heart rate
Physical measurements	Waist	
	BP	
STEP 3[Q]	Blood glucose	Triglycerides & HDL cholesterol
Biochemical measurements	Blood lipids	

Accidents and Injuries in India (in order of decreasing numbers)

- Road traffic accidents[Q]
- Work related injuries
- Burns
- Violence, Suicide
- Poisoning
- Drowning

Accidents and Injuries: Burns

- *Description:* Injury to skin and other organic tissue due to heat/radiation/radioactivity/electricity/friction/chemicals
- *Problem statement:*
  - Global: 11 million severe burns, 195,000 deaths per year
  - India: 1 million moderate/severe burn cases per year
- *Risk factors:*
  - Children, Young women more commonly affected in houses
  - Low, middle income countries
  - Hazardous occupations
  - Poverty, overcrowding, lack of proper safety measures
  - Young girls placement in household works
  - Underlying medical conditions (Epilepsy, peripheral neuropathy, disabilities)
  - Alcohol abuse, smoking
  - Easy access to chemicals used for assault
  - Kerosene use as a fuel source
  - Inadequate safety measures for LPG, electricity
- *Prevention strategy - First aid:*
  - DO's:
    - Remove clothing, irrigate burns
    - Use cool running water
    - Extinguish flames (roll on ground, blanket/water/extinguisher use)
    - Dilute chemicals (in chemical burns)
    - Wrap patient in clean cloth, transfer to health facility
  - DON'Ts :
    - Don't start first-aid before ensuring your won safety
    - Don't apply paste/oil/ turmeric/raw cotton
    - Don't apply ice
    - Avoid prolonged cooling with water (to prevent hypothermia)
    - Don't open blisters without availability of topical antibiotics
    - Don't apply any material directly to wound
    - Avoid topical medication until patient is in appropriate medical care

Accidents and Injuries: Snake Bite

- *Problem statement:*
  - 5 million snake bites per year
  - 2.5 million snake bite poisonings per year

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  - 0.1 million deaths per year
  - 0.3 million amputations and permanent disabilities
- *Clues of severe envenoming:*
  - Snake identified as dangerous
  - Rapid early extension of local swelling from site of bite
  - Early tender enlargement of local lymph nodes
  - Early systemic symptoms: Hypotension, shock, nausea, vomiting, diarrhoea, severe headache, heaviness of eyelids, excessive drowsiness, ptosis/ophthalmoplegia
- *National Snake-bite First-Aid Protocol (Government of India, 2007):*
  - Reassure the patient: 70% bites are non-poisonous; 50% bites from poisonous snakes actually envenomate patient
  - Immobilise like a fractured limb: Don't apply tight ligatures
  - Don't give alcoholic beverages, stimulants
  - Remove constricting items/ clothings
  - Don't incise or manipulate bite site (No ice application)
  - Transport patient to a medical facility
- *Anti-venom:*
  - First developed by: Albert Calmette
  - Description: Polyvalent nature, intravenous route

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MULTIPLE CHOICE QUESTIONS

SMALLPOX AND CHICKENPOX

1. **The infectivity of chickenpox lasts for:**
   (a) Till the last scab falls off *[AIPGME 2002]*
   (b) 6 days after onset of rash *[UP 2002]*
   (c) 3 days after onset of rash
   (d) Till the fever subsides

2. **Chickenpox is characterised by all *except*:**
   (a) Scabs are infective *[AIIMS May 1995]*
   (b) Pleomorphic stages
   (c) Rashes symmetrical centripetal dew-drop like
   (d) Palms and soles not affected by rash

3. **Smallpox eradication was successful due to all of the following reasons except:** *[AIPGME 2011] [AIIMS Nov 2010]*
   (a) Subclinical cases did not transmit the disease
   (b) A highly effective vaccine was available
   (c) Infection provided lifelong immunity
   (d) Cross-resistance existed with animal pox

4. **All of the following are true about Varicella virus except:** *[AIIMS Nov 2010]*
   (a) 10-30% chances of occurrence
   (b) All stages of rash are seen at the same time
   (c) Secondary attack rate is 90%
   (d) Rash commonly seen in flexor area

5. **WHO declared global eradication of Smallpox on:**
   (a) 26th October 1977 *[NUPGET 2013]*
   (b) 5th July 1975
   (c) 17th May 1975
   (d) 8th May 1980

6. **Secondary attack rate of chickenpox is:**
   (a) 60 *[Recent Question 2013]*
   (b) 50
   (c) 90
   (d) 40

7. **Chickenpox vaccine is:** *[Recent Question 2012]*
   (a) Live vaccine
   (b) Killed vaccine
   (c) Conjugated vaccine
   (d) Toxoid vaccine

8. **Chickenpox is infective** *[Recent Question 2014]*
   (a) 2 days before and 2 days after rash appearance
   (b) 2 days before and 5 days after rash appearance
   (c) 4 days before and 4 days after rash appearance
   (d) 4 days before and 5 days after rash appearance

Review Questions

9. **All are true about chickenpox *except*:**
   (a) Crusts contain live virus *[MP 2001]*
   (b) Centripetal in distribution *[MP 2002]*
   (c) Pleomorphic rashes seen
   (d) Rapid progression from macule to vesicle

MEASLES

10. **Which of the following is not true of Measles?**
    (a) High secondary attack rate *[AIPGME 2008]*
    (b) Only one strain causes infection
    (c) Not infectious in pro-dromal stage
    (d) Infection confers lifelong immunity

11. **Which of the following is the 'Least common' complication of measles?** *[AIIMS May 2006, May 2007]* *[Recent Question 2014]*
    (a) Diarrhea
    (b) Pneumonia
    (c) Otitis media
    (d) SSPE

12. **Which of the following statements is true about the epidemiological determinants of measles?** *[AIIMS Nov 2005]*
    (a) Measles virus survives outside the human body for 5 days
    (b) Carriers are important sources of infection
    (c) Secondary attack rate is less than that of rubella
    (d) Incidence of measles is more in males than females

13. **True about measles is all *except*:** *[AIPGME 1996]*
    (a) Kopliks spots appear as rash disappears
    (b) It is prevented by both active and passive immunization
    (c) Otitis media and meningitis are the most common complications
    (d) TB is aggravated in post measles

14. **All are true regarding measles vaccine *except*:** *[AIPGME 1996]*
    (a) Freeze dried live attenuated vaccine
    (b) Single intramascular dose of 0.5 ml
    (c) Is occasionally associated with TSS
    (d) Contraindicated in pregnancy

15. **Which of the following is the reservoir for measles?**
    (a) Man *[DPG 2007]*
    (b) Soil
    (c) Fomites
    (d) Monkey

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16. **True about measles:** *[PGI June 04]*
    (a) Koplik spot appears in Prodromal stage
    (b) Fever stops after onset of Rash
    (c) Vaccine given at 9 months
    (d) It is not diagnosed when coryza and rhinitis is absent
    (e) Incubation period is 6 days

17. **Measles vaccination campaign between 9-14 years age for elimination is:** *[AIIMS PGMEE November 2013]*
    (a) Keep up
    (b) Follow up
    (c) Mop up
    (d) Catch up

18. **Koplik spots are seen in:** *[DNB December 2011]* *[Bihar 2006]*
    (a) Prodromal stage
    (b) Incubation
    (c) Eruptive
    (d) Convalescent stage

19. **Most serious complication of Measles is:** *[NUPGET 2013]*
    (a) Koplik spots
    (b) Parotitis
    (c) Meningoencephalitis
    (d) Nephritis

20. **Most common cause of death due to measles is**
    (a) Pneumonia *[AP 2014]*
    (b) Secondary bacterial infection *[Bihar 2006]*
    (c) Measles encephalitis
    (d) Otitis media

21. **Post-exposure Measles vaccine must be given within ... day(s) of exposure** *[Recent Question 2015]*
    (a) 1 day
    (b) 3 days
    (c) 7 days
    (d) 10 days

22. **Supplementary immunization service for measles immunization?** *[Recent Question 2015]*
    (a) Keep up with >95% immunized
    (b) Catch up
    (c) Follow up
    (d) All of the above

Review Questions

23. **To eradicate measles the percentage of infant population to be vaccinated is at least ____%:** *[DNB 2001]*
    (a) 70 *[Recent Question 2012]*
    (b) 80 *[DNB 2005]*
    (c) 85
    (d) 95

24. **Measles vaccine is not given before:** *[DNB 2003]*
    (a) 9 months
    (b) 12 months
    (c) 15 months
    (d) 18 months

25. **For measles:** *[Bihar 2003]*
    (a) Incubation period is 10 days
    (b) Infectious 4 days before the rash
    (c) Koplik's spots are seen
    (d) All

26. **In Measles, infective period is:** *[UP 2008]*
    (a) 3 days before and 4 days after the appearance of rash
    (b) 4 days before and 3 days after the appearance of rash
    (c) 4 days before and 5 days after the appearance of rash
    (d) 5 days before and 4 days after the appearance of rash

27. **The incubation period of Measles is:** *[AP 2001]* *[Recent Question 2013]*
    (a) 3 days
    (b) 10 days
    (c) 21 days
    (d) 30 days

28. **All are true about measles *except*:** *[MP 2000]*
    (a) Both active and passive immunization are given simultaneously
    (b) Flaring up of TB
    (c) Most infectious during rashes
    (d) Causes pneumonia and otitis media

29. **A baby was given a dose measles vaccine at 6 months of age due to epidemic of measles/malnutrition. Correct regarding giving subsequent dose will be:** *[MH 2007]*
    (a) Give one more dose as soon as possible
    (b) Give after 14-16 months with booster dose
    (c) Give after 9 months age
    (d) No dose required

RUBELLA

30. **Recommended vaccination strategy for rubella is to vaccinate first and foremost:** *[AIPGME 2007]* *[RJ 2008]*
    (a) Women 15-49yrs
    (b) Infants
    (c) Adolescent girls
    (d) Children 1-14yrs

31. **Risk of the damage of fetus by maternal rubella is maximum if mother gets infected in** *[AIIMS Nov 2005]* *[AIIMS 1997]*
    (a) 6-12 weeks of pregnancy
    (b) 20-24 weeks of pregnancy
    (c) 24-28 weeks of pregnancy
    (d) 32-36 weeks of pregnancy

32. **All of the following statements are true about Congenital Rubella *except*:** *[AIIMS 2011, AIPGME 2005]*
    (a) It is diagnosed when the infant has IgM antibodies at birth
    (b) It is diagnosed when IgG antibodies persist for more than 6 months
    (c) Most common congenital defects are deafness, cardiac malformations and cataract
    (d) Infection after 16 weeks of gestation results in major congenital defects

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33. MMR vaccine is recommended at the age of: *[Recent Question 2013]*
(a) 9-12 months
(b) 15-18 months
(c) 2-3 years
(d) 10-19 years

Review Question

34. Rubella features include all except: *[AP 2003]*
(a) Tender lymphnodes in the neck
(b) Congenital infection with cataract
(c) Incubation period < 10 days
(d) Caused by RNA virus

MUMPS

35. M.C. complication of mumps in children is:
(a) Pneumonia *[RJ 2004]*
(b) Pancreatitis
(c) Aseptic meningitis
(d) Encephalitis

36. Incubation period of Mumps is: *[Recent Question 2013]*
(a) 7 days (b) 10 days
(c) 14 days (d) 18 days

INFLUENZA

37. Which of the following is not true about influenza virus? *[AIIMS June 1999]*
(a) Influenza virus A is subject to frequent antigenic variations
(b) Antigenic drift is a gradual antigenic change over a period of time
(c) Antigenic shift is due to genetic recombination of virus
(d) Major epidemics are due to antigenic drift

38. Newer Influenza vaccine include: *[PGI June 08]*
(a) split – virus vaccine
(b) neuraminidase
(c) live attenuated vaccine
(d) killed vaccine
(e) Recombinant vaccine

39. True about epidemiology of influenza:
(a) Asymptomatic seen rarely *[PGI June 05]*
(b) Incubation period 10-12 hrs
(c) Pandemic rare
(d) Extra human reservoir not seen
(e) All ages and sex equally affected

40. Which of the following is true about influenza:
(a) Affects all ages and sexes *[PGI June 06]*
(b) I. P 18 – 72 hrs
(c) Pandemics rare
(d) Asymptomatics rare
(e) No animal reservoir

41. Which of the following lead to an outbreak of Influenza in China in 2013? *[PGI May 2013]*
(a) H1N1 (b) H3N2
(c) H2N2 (d) H7N9
(e) H5N1

42. Incubation period of swine flu: *[Recent Question 2013]*
(a) 1-3 days (b) 2-3 weeks
(c) 10-15 days (d) 5 weeks

43. Pig in H1N1 influenza acts as: *[DNB December 2010]*
(a) Carrier
(b) Amplifying host
(c) Reservoir
(d) Vector

44. Major reason for H5N1 not to become a global pandemic is *[AIIMS November 2014]*
(a) Route of transmission is not respiratory
(b) Man to man transmission is rare
(c) Does not cause serious disease among humans
(d) Restricted to few countries only

45. All are used in treatment of Influenza B *except*: *[Recent Question 2015]*
(a) Oseltamivir
(b) Zanamivir
(c) Premavir
(d) Ribavirin

DIPHTHERIA

46. True about Diphtheria are all except:
(a) Carriers are more common sources of infection than cases *[AIPGME 1996] [AIIMS Nov 1996]*
(b) Incubation period is 2-6 days
(c) 25 Lf of diphtheria toxoid are present per ml in DPT vaccine
(d) Diphtheria is an endemic disease in India

47. Positive Schick test indicates: *[AIPGME 1996]*
(a) Immunity to diphtheria *[AIIMS Dec 1994]*
(b) Susceptibility to diphtheria
(c) Hypersensitivity to diphtheria
(d) Infection with diphtheria

48. A herd immunity of over …….. % is considered necessary to prevent epidemic spread of diphtheria: *[Recent Question 2012]*
(a) 50% *[DNB 2000]*
(b) 55%
(c) 60%
(d) 70%

49. Management of non-immunized diphtheria contacts include all *except*: *[PGI November 2014]*
(a) Prophylactic penicillin
(b) Single dose of toxoid
(c) Daily throat examination
(d) Daily throat swab culture
(e) Weekly throat swabs examination

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50. Incubation period of Diphtheria and Salmonella is *[Recent Question 2015]*
(a) 1-2 days & 20-40 days
(b) 2-6 days & 7-21 days
(c) 2-6 days & 10-14 days
(d) 1-2 days & 10-14 days

Review Questions

51. Treatment of choice for diphtheria carriers is:
(a) Erythromycin *[DNB 2003]*
(b) Tetracycline
(c) Penicillin
(d) DPT

52. Schick test does not indicate: *[Kolkata 2003]*
(a) Immunity to diphtheria
(b) Susceptibility to diphtheria
(c) Hypersensitivity to diphtheria
(d) Carrier of diphtheria

53. Diphtheria carrier are diagnosed by: *[MP 2000]*
(a) Throat culture (b) Gram's staining
(c) Albert's staining (d) Schick test

54. A Negative Schick test indicates: *[MP 2007]*
(a) Immunity to diphtheria
(b) Susceptibility to diphtheria
(c) Immunity to pertusis
(d) Immunity to mumps

WHOOPING COUGH

55. The usual incubation period for pertussis is:
(a) 7-14 days *[AIIMS Nov 2005, AIIMS Nov 1996]*
(a) 7-14 days *[AIIMS June 2000]*
(b) 3-5 days
(c) 21-25 days
(d) Less then 3 days

56. Which of the following statements is true regarding pertussis? *[AIPGME 2002]*
(a) Neurological complication rate of DPT is 1 in 50000
(b) Vaccine efficacy is more than 95%
(c) Erythromycin prevents spread of disease between children
(d) Leukocytosis correlates with the severity of cough

57. True regarding pertussis is all *except*: *[AIIMS Nov 1997, AIIMS May 1995]*
(a) It is associated with an inspiratory whoop
(b) It is a droplet infection
(c) Parapertussis causes more severe disease then pertussis
(d) Pneumonia is most common complication

58. True about Pertussis is/are: *[PGI May 2012]*
(a) Incubation period is 7-14 days
(b) Main source of infection is chronic carriers
(c) Can affect any age
(d) Secondary attack rate in unimmunised persons is 90%
(e) More common in Summers

Review Questions

59. Treatment for pertussis contacts children for:
(a) Prophylactic antibiotic for 10 days *[UP 2000]*
(b) Prophylactic antibiotic for 14 days
(c) Prophylactic antibiotic for 12 days
(d) Prophylactic antibiotic for 11 days

60. A child with pertussis should be isolated for:
(a) 1-2weeks *[Kolkata 2003]*
(b) 2-4weeks
(c) 3-4weeks
(d) 4-6weeks

61. About pertussis true is: *[MP 2000]*
(a) Secondary attack rate 90%
(b) No cross immunity with parapertussis
(c) Most infectious during paroxysmal stage
(d) Affects only humans

62. The neurological complications of DPT are due to:
(a) Pertussis component *[Bihar 2003]*
(b) Diphtheria
(c) Tetanus
(d) All

MENINGOCOCCAL MENINGITIS

63. True about meningococcal meningitis is: *[AIIMS May 1994]*
(a) Causative agent is a gram –ve diplococci
(b) Cases are the most important source of infection
(c) Treatment with penicillin eradicates carrier state
(d) Vaccine can be given in pregnancy

64. The following statements about meningococcal meningitis are true, *except*: *[AIPGME 1991, AIIMS Nov 1997, AIIMS Jun 98, AIPGME 2003]*
(a) The source of infection is mainly clinical cases
(b) The disease is more common in dry and cold months of the year
(c) Chemoprophylaxis of close contacts of cases is recommended
(d) The vaccine is not effective in children below 2 years of age

65. Xavier and Yogender stay in the same hostel of the same university. Xavier develops infection with Group B meningococcus. After a few days, Yogender develops infection due to Group C meningococcus. All the following are true statements *except*: *[AIPGME 2002]*
(a) Educate students about meningococcal transmission and take preventive measures
(b) Chemoprophylaxis against both Group B and Group C

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(c) Vaccine prophylaxis of contacts of Xavier
(d) Vaccine prophylaxis of contacts of Yogender

66. Vaccine for meningococcal meningitis should be routinely given to: *[AIIMS PGMEE May 2013]*
(a) Laboratory workers
(b) Young adolescents
(c) 4-8 years old children
(d) Elderly population

67. Prophylaxis of meningococcal meningitis is: *[WB 2008, DNB December 2009]*
(a) Ciprofloxacin (b) Rifampicin
(c) Penicillin (d) Gentamycin

68. WHO criteria for High endemicity for Meningococcal disease include: *[AIIMS PGMEE May 2013]*
(a) 0.1% (b) 0.01%
(c) 0.001% (d) 1.0%

69. Meningococcal vaccine available is: *[Recent Question 2013]*
(a) ACW135Y (b) ABCW135
(c) CYW135B (d) ABCY

70. MC serotype of Meningococcus causing Epidemics worldwide is *[Recent Question 2015]*
(a) A
(b) W-135
(c) C
(d) Y

71. With reference to meningococcal meningitis, which one of the following statements is not correct? *[UPSC CMS 2015]*
(a) Fatality in untreated cases is 60%
(b) Disease spreads mainly by droplet infection
(c) Treatment of cases has no significant effect in epidemiological pattern of disease
(d) Mass chemoprophylaxis causes immediate drop in incidence rate of cases

ARI

72. A 2-year-old female child was brought to a PHC with a history of cough and fever for 4 days with inability to drink for last 12 hours. On examination, the child was having weight of 5 kg and respiratory rate of 45/minute with fever. The child will be classified as suffering from: *[AIPGME 2004, 2005, AIIMS June 2000]*
(a) Very severe disease (b) Severe Pneumonia
(c) Pneumonia (d) No Pneumonia

73. A child aged 24 months was brought to the Primary Health Centre with complaints of cough and fever for the past 2 days. On examination, the child weighed 11 Kg respiratory rate was 38 per minute, chest indrawing was present. The most appropriate line of management for this patient is? *[AIPGME 2002, IPGME 2003]*
(a) Classify as pneumonia and refer urgently to secondary level hospital
(b) Classify as pneumonia, start antibiotic and advise to report after 2 days
(c) Classify as severe pneumonia, start antibiotics and refer urgently
(d) Classify as severe pneumonia and refer urgently

74. Most important feature to diagnose severe pneumonia: *[Recent Question 2013]*
(a) Cyanosis (b) Chest indrawing
(c) Nasal flaring (d) Fast breathing

75. A 10 month old child is brought to a PHC with history of cough and cold. On examination, he has respiratory rate of 48 breaths per minute and there is absence of chest indrawing. His weight is 5 kg. He is probably suffering from *[AIIMS November 2014]*
(a) No pneumonia
(b) Pneumonia
(c) Severe pneumonia
(d) Very severe pneumonia

76. Not evaluated in Clinical evaluation pneumonia at PHC *[Recent Question 2014]*
(a) Respiratory rate
(b) Inability to feed
(c) Oxygen saturation
(d) Chest in drawing

Review Question

77. Respiratory rate can be diagnosed as fast breathing in a less than 2-month-old infant, if respiratory rate/minute is more than: *[Kolkata 2004]*
(a) 29 (b) 39
(c) 49 (d) 59

TUBERCULOSIS

78. All of the following are the targets of STOP TB STRATEGY partnership *except*:
(a) Achieve a diagnosis rate > 70% and cure rate > 85% (by 2005) *[AIIMS Nov 2008]*
(b) Reduce prevalence to < 150 per 100,000 population per year (by 2010)
(c) Lower deaths to < 1 per 100,000 population per year (by 2010)
(d) Global incidence of TB disease ≤ 1 case per million population per year

79. If the objective of the investigator is to assess the incidence of tuberculosis infection in a community, the most appropriate methodology would be to: *[AIIMS Nov 2005, 2006, AIPGME 2007]*
(a) Identify all individuals with positive tuberculin test
(b) Perform sputum examination of chest symptomatics
(c) Identify new converters to Tuberculin test
(d) Screen all under-five children with Tuberculin test

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80. Point of control in tuberculosis the infection is:
(a) < 1% in 0-14 group of children *[AIPGME 1991]*
(b) > 1% is all children 0-5 yrs age group
(c) < 1% in 15-49 of age group
(d) < 2% in 0-14 group

81. Which of the following is true about tuberculin test?
(a) It gives the immune status of patient *[AIPGME 1997]*
(b) It may be negative in dissociated tuberculosis
(c) It tells about prior exposure to Mycobacterium tuberculosis only
(d) It is highly positive in a post measles case

82. The most appropriate test to assess the prevalence of tuberculosis infection in a community is: *[AIIMS May 92, AIPGME 04]*
(a) Mass Miniature Radiography
(b) Sputum examination *[Recent Questions 2014]*
(c) Tuberculin test
(d) Clinical examination

83. National Tuberculosis Institute is located at:
(a) New Delhi *[AIIMS Nov 2003]*
(b) Chingelput *[DNB 2003]*
(c) Bangalore
(d) Chennai

84. Decrease in which of the following parameters indicate the decrease in tuberculosis problem in India?
(a) Incidence of infection *[DPG 2004]*
(b) Prevalence of infection
(c) Incidence of disease
(d) Prevalence of disease

85. The overall prevalence of tuberculosis infection in India as per 4th round of longitudinal survey was:
(a) 20% *[Karnataka 2004]*
(b) 30%
(c) 40%
(d) 50%

86. The percentage of positive Mantoux test in Indian if 20-40 yrs age group is: *[PGI Dec 03]*
(a) < 5% (b) 5 – 10%
(c) 20 – 30% (d) > 50%
(e) > 80%

87. Population of a village on 1st June 2007 is 16,500. Since 1st January 2007, 22 new cases of TB were detected. Total registered cases were 220. what is the incidence of TB?
(a) 133 per 100, 000 *[AIPGME 2010]*
(b) 121 per 100, 000
(c) 111 per 100, 000
(d) 100 per 100, 000

88. Which of the following is not false about annual risk of TB? *[AIPGME 2010]*
(a) ARI of 1% = 75 new cases
(b) Current ARI in India is 1.7%
(c) It represents new cases of TB.
(d) It is assessed by tuberculin conversion in previously non-vaccinated children

89. McKneown's Theory states that reduced prevalence of Tuberculosis occurs due to: *[AIPGME 2011]*
(a) Enhanced knowledge and awareness
(b) Medical advancements
(c) Behavioural modification
(d) Social and environmental factors

90. A lactating woman has sputum positive Tuberculosis and her neonate child is 3 months old. What is the recommended chemoprophylaxis? *[AIIMS May 2011]*
(a) INH 3 mg/kg for 3 months
(b) INH 5 mg/kg for 3 months
(c) INH 3 mg/kg for 6 months
(d) INH 5 mg/kg for 6 months

91. Antitubercular drug which causes Optic neuritis is: *[NUPGET 2013]*
(a) Ethambutol (b) Rifampicin
(c) Isoniazid (d) Pyrizinamide

92. Number of (+) for tubercle bacilli if count in AFB sample is > 10 per oil immersion fields? *[Recent Question 2013]*
(a) + (b) ++
(c) +++ (d) Scanty

93. One TB infected person can infect how many people in 1 year? *[Recent Question 2013]*
(a) 20 (b) 30
(c) 10 (d) 5

94. Incidence of TB in a community measured by: *[DNB December 2011]*
(a) Sputum smear + *[Recent Questions 2014]*
(b) Tuberculin test +
(c) Sputum culture
(d) Mantoux test +

95. The most appropriate test to assess the prevalence of tuberculosis infection in a community is: *[DNB 2007]*
(a) Mass miniature radiography
(b) Sputum examination
(c) Tuberculin test
(d) Clinical examination

96. Mycobacterium tuberculosis infection in humans is most common because of: *[Recent Question 2013]*
(a) Contact (b) Inhalation
(c) Infiltration (d) Inoculation

97. One of the following is known as Tuberculin Conversion Index: *[NUPGET 2013]*
(a) Incidence of infection
(b) Prevalence of infection
(c) Incidence of disease
(d) Prevalence of disease

98. Xpert MTB/RIF test is used to detect: *[PGI May 2013]*
(a) For assessing resistance to isoniazid
(b) For assessing multi drug resistant TB
(c) For assessing rifampicin resistance
(d) Monitoring drug response in MDR TB
(e) Diagnosis of TB

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99. TB multidrug regimen is given to: *[Recent Question 2013]*
(a) Prevent resistance
(b) Broad spectrum
(c) Prevent side effects
(d) None

100. Sputum positive TB is: *[DNB June 2009]*
(a) 1 out of 2 sputum sample +ve
(b) 2 out of 3 sputum sample +ve
(c) BACTEC +ve
(d) Mantoux test positive

101. Tuberculin positive means: *[DNB June 2011]*
(a) Immunodeficient patient
(b) Resistance to tuberculin protein
(c) Patient is infected with mycobacterium
(d) Patient is suffering from disease

102. Sputum positive TB patients on chemotherapy should be isolated at least for *[Recent Question 2014]*
(a) 2 weeks
(b) 3 weeks
(c) 4 weeks
(d) 6 weeks

103. Contacts of Sputum positive tuberculosis patient who should be given preventive chemotherapy
(a) Pregnant women *[Recent Question 2014]*
(b) Old people
(c) Children above 6 years
(d) Children below 6 years

104. Tuberculin test is a cheap and easily available test. In which of the following situations there is high failure in interpretation of result? *[AIIMS PG May 2015]*
(a) Environmental mycobacterium infections are less
(b) High prevalence of immunized people
(c) High prevalence of disease
(d) Lesser number of HIV positive cases

105. What is true about TB in a diabetic? *[Recent Question 2015]*
(a) Severity of TB increases
(b) Incidence of TB increases
(c) Course of TB disease changes
(d) All of the above

106. WHO defines Multi-drug resistant (MDR) Tuberculosis strain as one that is *[UPSC CMS 2015]*
(a) At least resistant to INH
(b) At least resistant to Rifampicin
(c) Resistant to INH and Rifampicin with or without resistant to other anti TB drugs
(d) Resistant to Streptomycin only

107. TB Research Centre is located at *[Recent Question 2015]*
(a) Chennai
(b) New Delhi
(c) Bangalore
(d) Ahmedabad

108. According to WHO Guidelines, Latent TB investigation is not done in *[AIIMS November 2015]*
(a) Patient on TNF inhibitors
(b) Silicosis
(c) Chronic alcoholism
(d) Dialysis

Review Questions

109. Tuberculin unit is: *[DNB 2003]*
(a) 0.0001 mg
(b) 1 unit of PPD RT3
(c) 0.1 mg BCG
(d) None of the above

110. By WHO best criteria for TB diagnosis is:
(a) Sputum + ve *[Bihar 2005]*
(b) Chest pain *[DNB 2000]*
(c) Cough – 3 weeks
(d) X-ray finding

111. True about tuberculosis: *[MP 2000]*
(a) $>10^4$ bacilli are required in sputum for detection
(b) Mantoux test can differentiate between BCG and infection
(c) Can be grown on ordinary culture media
(d) Drug sensitivity is tested by schick test

112. In tuberculosis combination of Antimicrobials is used:
(a) To delay the development of resistance *[MP 2002]*
(b) To reduce toxicity
(c) To Broaden anti-bacterial spectrum
(d) To prevent Liberation of toxins from organisms

113. Number of sputum positive cases of tuberculosis per lakh in India is: *[MH 2000]*
(a) 75 (b) 50
(c) 40 (d) 10

114. BCG is: *[MH 2002]*
(a) Live attenuated vaccine
(b) Killed vaccine
(c) Toxoid
(d) Immunosuppressant agent

115. 1 mL of expectoration contains what minimum number of TB bacilli in an active case of TB? *[MH 2002]*
(a) 100 (b) 1,000
(c) 10,000 (d) 1,00,000

116. In India, a tubercular mother is advised for all *except*:
(a) Give baby BCG *[RJ 2003]*
(b) ATT to mother
(c) With hold Breastfeeding
(d) None of these

POLIOMYELITIS

117. Which type of sample can be used to isolate poliovirus earliest? *[AIIMS Nov 2004]*
(a) Stool (B) Blood
(C) Throat (d) CSF

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118. True about oral polio vaccine: *[PGI June 03]*
(a) Poliomyelitis in recipients
(b) Poliomyelitis in contact of recipient
(c) Guillein Barre syndrome
(d) Vomiting and fever

119. True about complete eradication of poliomyelitis from India is: *[AIIMS PGMEE November 2013]*
(a) From 2012 onwards, no vaccine associated polio case has been detected
(b) Last polio case in India was reported in 13 January 2011
(c) Mostly IPV is used currently
(d) India is the only country which is not able to eliminate it completely

120. Regarding poliovirus responsible for poliomyelitis all are true *except*: *[DNB June 2010]*
(a) Type 3 is most common is India
(b) Type 1 is most common in India
(c) Type 1 is responsible for most epidemics
(d) Type 2 is eradicated worldwide

121. For every clinical case of poliomyelitis subclinical cases are: *[Recent Question 2013]*
(a) 500 in children and 75 in adults *[UP 2005]*
(b) 500 in children and 25 in adults
(c) 250 in children and 25 in adults
(d) 1000 in children and 75 in adults

122. Which of the following is not a type of Vaccine derived polio virus? *[AIIMS November 2014]*
(a) cVDPV
(b) iVDPV
(c) aVDPV
(d) mVDPV

123. Polio virus is shed maximum in stool up to
(a) 6 weeks *[Recent Question 2014]*
(b) 8 weeks
(c) 10 weeks
(d) 12 weeks

124. Wild poliomyelitis is still endemic in
(a) Sri Lanka *[PGI November 2014]*
(b) Pakistan
(c) India
(d) Afghanistan
(e) Nigeria

125. Incubation period of Vaccine associated paralytic poliomyelitis is *[JIPMER 2015]*
(a) 1-2 hours
(b) 1-3 days
(c) 7-10 years
(d) 4-30 days

126. Which of the following serotypes of Polio virus is most commonly associated with vaccine associated paralytic poliomyelitis? *[PGMCET 2015]*
(a) Serotype 1
(b) Serotype 2
(c) Serotype 3
(d) Serotype 1 and 2

127. Which of the following is least suggestive of poliovirus infection? *[UPSC CMS 2015]*
(a) Low grade fever and malaise with complete resolution in 2 to 3 days
(b) Biphasic illness with several days of fever, then meningeal symptoms and asymmetric flaccid paralysis 5 to 10 days later
(c) Descending motor paralysis with preservation of tendon reflexes and absent sensation
(d) Failure to isolate a virus from the CSF in the presence of marked meningismus

Review Questions

128. Polio is due to: *[Bihar 2006]*
(a) Virus (b) Bacteria
(c) Protozoa (d) Fungus

129. Mg++ is used in OPV vaccine as: *[Kolkata 2008]*
(a) Stabilizer (b) Adjuvant
(c) Preservative (d) Vehicle

130. Killed Vaccine of polio is: *[RJ 2000]*
(a) Salk (b) Sabin
(c) Both (d) None

131. Wrong about polio patient who had paralysis:
(a) Most predominant polio virus during epidemic is type I *[RJ 2006]*
(b) Sub clinical infection common
(c) Can transmit It by nasal discharge
(d) Can be given vaccine

132. All are true about SALK vaccine *except*:
(a) It prevents paralysis *[RJ 2009]*
(b) Oral polio can be given as booster
(c) It is contraindicated in immunocompromised patients
(d) Easily transported

HEPATITIS

133. Which of the following is not transmitted through sexual route? *[AIPGME 2003]*
(a) Hepatitis A
(b) Hepatitis E
(c) Both Hepatitis A and Hepatitis E
(d) Hepatitis D

134. Marker for infectivity of serum in Hepatitis B is: *[AIIMS Nov 1993]*
(a) HBsAg (b) Anti HBc
(c) HBe Ag (d) Anti HBc

135. Which of the Hepatitis B Virus serological marker indicates the first evidence of Hepatitis B infection? *[Karnataka 2009]*
(a) Anti-HBs (b) Anti-HBc
(c) HBeAg (d) HBsAg

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136. Which of the following is true about HCV screening? *[PGI Dec 04]*
(a) Medical students are screened before their joining
(b) IV drug abuser are prone to infection
(c) Blood products taken before 1997 should be screened
(d) Long term hemodialysis
(e) Interferon is treatment

137. Hepatitis A true is: *[PGI June 06]*
(a) Causes mild illness in children
(b) 3% incidence of carrier state
(c) Sexual route common
(d) 10% transform into HCC
(e) Vertical Transmission never seen

138. Which of the following is/are seen in Acute Hepatitis-B? *[PGI May 2011]*
(a) HBsAg (b) Anti-HBs
(c) Anti-HBc (d) HBeAg
(e) Anti-HBe

139. Both HBsAg and HBeAg are positive in: *[AIIMS PGMEE May 2013]*
(a) Acute infectious Hepatitis B *[AIIMS Nov 2014]*
(b) Chronic Hepatitis B
(c) Recovery phase of Hepatitis B
(d) Individuals vaccinated with Hepatitis B

140. 1955 Hepatitis outbreak is Delhi was: *[Recent Question 2013]*
(a) A (b) B
(c) C (d) E

141. Isolation period of Hepatitis A: *[DNB December 2011]*
(a) 1 weeks (b) 2 weeks
(c) 3 weeks (d) 4 weeks

142. Acute Hepatitis B marker(s) is/ are: *[PGI May 2012]*
(a) HBsAg (b) Anti HBs
(c) Anti HBc (d) HBeAg
(e) Anti HBe

143. A mother is HBsAg positive at 32 weeks of pregnancy. What should be given to the newborn to prevent neonatal infection? *[Recent Question 2013]*
(a) Hepatitis B vaccine + Immunoglobulin
(b) Immunoglobulin only
(c) Hepatitis B vaccine only
(d) Immunoglobulin followed by vaccine 1 month later

144. Most important in diagnosing Acute Hepatitis B is
(a) IgG Anti-HBc *[AIIMS Nov 2014]*
(b) IgM Anti-HBc
(c) Anti HBs
(d) HBsAg

145. A nurse was diagnosed to have HBeAg and HBsAg in serum. Most likely she is having
(a) Chronic hepatitis B *[AIIMS November 2014]*
(b) HBV + HBE coinfection
(c) Active and infectious Hepatitis B disease
(d) Recovery from Hepatitis B

146. Seen in Superinfection of HDV is *[Recent Question 2015]*
(a) IgM Anti-HBc, IgM Anti-HDV
(b) IgM Anti-HBs, HDVAg, IgM Anti-HDV, HDV RNA
(c) IgM Anti-HBc, HDVAg, IgM Anti-HDV, HDV RNA
(d) HDVAg, IgM Anti-HDV, HDV RNA

147. Which of the following viral markers signifies the ongoing viral replication in the case of Hepatitis-B infection? *[UPSC CMS 2015]*
(a) Anti-HBs
(b) Anti-HBc
(c) HBe Ag
(d) HBs Ag

Review Questions

148. Hepatitis A virus shedding in faeces is: *[UP 2004]*
(a) One week before the symptoms appear
(b) Two weeks after the symptoms appear
(c) Two weeks before the symptoms and two week thereafter
(d) One week before the symptoms and one week thereafter

149. Epidemiological marker of Hepatitis–B is:
(a) HBs Ag *[UP 2008]*
(b) Anti - HBs
(c) Anti HBc
(d) HBe Ag

150. Chances of Viral Hepatitis Type C becoming a chronic infection are: *[MP 2009]*
(a) 10% (b) 20%
(c) 30% (d) 50% or more

DIARRHEAL DISEASES (CHOLERA AND TYPHOID)

151. The freshly prepared ORS (Oral Rehydration Solution) should not be used after: *[AIPGME 1993]*
(a) 6 hours (b) 12 hours
(c) 18 hours (d) 24 hours

152. A 5-year-old boy passed 18 loose stools in last 24 hours and vomited twice in last 4 hours. He is irritable but drinking fluids. The optimal therapy for this child is:
(a) Intravenous fluids *[AIPGME 2003]*
(b) Oral rehydration therapy
(c) Intravenous fluid initially for 4 hours followed by oral fluids
(d) Plain water add libitum

153. The best approach to prevent cholera epidemic in a community is: *[AIPGME 1992]*
(a) Mass chemoprophylaxis with tetracycline
(b) Vaccination of all individuals
(c) Health education
(d) Safe water and sanitation

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154. Which of the following is the drug of choice for chemoprophylaxis of cholera?
(a) Tetracycline *[AIIMS May 2005]*
(b) Doxycycline *[UP 2004]*
(c) Furazolidone *[Recent Question 2013]*
(d) Co-trimoxazole

155. The usual incubation period for typhoid fever is:
(a) 10-14 days *[AIIMS May 1994]*
(b) 3-5 days *[Recent Question 2012]*
(c) 21-25 days *[Recent Question 2013]*
(d) Less then 3 days

156. The drug of choice for treating cholera in pregnant women is: *[AIIMS Nov 2005]*
(a) Tetracycline (b) Doxycycline
(c) Furazolidone (d) Cotrimoxazole

157. The drug of choice for treating cholera in children is:
(a) Tetracycline *[AIIMS Nov 2005]*
(b) Doxycycline *[UP 2004]*
(c) Furazolidone
(d) Cotrimoxazole

158. True about citrate in ORS: *[AIIMS June 1997]*
(a) Increases shelf life (b) Nutritious
(c) Cheaper (d) Tastier

159. The sodium content of ReSoMal (rehydration solution for malnourished children) is: *[AIPGME 2006]*
(a) 90 mmol/L (b) 60 mmol/L
(c) 45 mmol/L (d) 30 mmol/L

160. Which one of the following gives strong evidence of Typhoid Fever carrier status:
(a) Isolation of Core antigen *[AIIMS Nov 2008]*
(b) Isolation of Vi antigen
(c) Persistence of Vi antibodies
(d) Demonstration of Typhoid bacilli in stools

161. For controlling an outbreak of cholera, all of the following measures are recommended *except*:
(a) Mass chemoprophylaxis *[AIPGME-1992 and 2003]*
(b) Proper disposal of excreta *[AIIMS 1991, 1997]*
(c) Chlorination of water
(d) Early detection and management of cases

162. Antibiotic treatment of choice for treating cholera in an adult is a single dose of: *[AIPGME 2005]*
(a) Tetracycline (b) Co-trimoxazole
(c) Doxycycline (d) Furazolidone

163. A convalescent case of cholera remains infective for:
(a) < 7 days *[DPG 2005]*
(b) 7-14 days
(c) 14-21 days
(d) 21-28 days

164. Ringer lactate true is: *[PGI Dec 07]*
(a) Cl^- - 111
(b) Na^+ - 45
(c) K^+ - 5
(d) Lactate – 29
(e) Ca^{+2} - 5

165. A 12 kg child with diarrhoea, fluid to be replaced in first 4 hours: *[Recent Question 2013]*
(a) 0-400 ml (b) 400-800 ml
(c) 800-1200 ml (d) 1200-1600 ml

166. Which is true of typhoid? *[DNB 2008]*
(a) Female carriers are less common
(b) Male carriers though less are more dangerous
(c) Gall bladder usually not involved in carrier state
(d) Tetracycline is the DOC for carriers

167. Persistent diarrhoea in infants: *[Recent Question 2013]*
(a) 7 days (b) 14 days
(c) 21 days (d) 1 month

168. ORS should be discarded after: *[DNB December 2011]*
(a) 54 hours (b) 6 hours
(c) 12 hours (d) 24 hours

169. ORS contains 75 mmol/litre of: *[Recent Question 2013]*
(a) Sodium (b) Potassium
(c) Glucose (d) Chloride

170. Dehydration in a child with diarrhoea, thirst present, tears absent is: *[Recent Question 2013]*
(a) Mild
(b) Moderate
(c) Severe
(d) None

171. Concentration of sodium in mMol/L in low osmolar ORS is? *[DNB December 2011]*
(a) 45 (b) 75
(c) 90 (d) 60

172. New WHO ORS osmolarity is: *[Recent Question 2012]*
(a) 270 (b) 245 *[PGMCET 2015]*
(c) 290 (d) 310

173. ORS amount required in first 4 hours in a 1 year old case of dehydration is: *[Recent Question 2012]*
(a) 200-400 ml (b) 400-600 ml
(c) 600-800 ml (d) 800-1200 ml

174. Which of the following about the composition of new ORS is wrong: *[DNB June 2009]*
(a) NaCl– 2.6 grams/litre
(b) KC1– 1.5 grams/litre
(c) Glucose – 13.5 grams/litre
(d) Total osmolarity – 300mmol/1

175. True of 8th Pandemic of Cholera *[PGI May 2014]*
(a) Started in Bangladesh
(b) Originated in 2012
(c) Due to O139 El Tor
(d) Low attack rate
(e) Low proportion of adults in endemic regions

176. A village affected with epidemic of cholera, what is the 1st step which should to be taken in village to decrease the death from cholera *[Recent Question 2014]*
(a) Safe water supply and sanitation
(b) Cholera vaccination to all individuals
(c) Primary Chemoprophylaxis
(d) Treat everyone in the village' with tetracycline

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177. **Ratio of Sodium : Glucose in WHO Reduced Osmolarity ORS is** *[JIPMER 2014]*
(a) 1:4
(b) 1:3
(c) 1:2
(d) 1:1
(e) 4:1

178. **Mechanism of action of Cholera toxin is through** *[Recent Question 2015]*
(a) Gangliosides
(b) Adenyl cyclase
(c) Gangliosides + Adenyl cyclase
(d) Exotoxin

179. **Chemoprophylaxis is indicated in the following conditions except** *[UPSC CMS 2015]*
(a) Cholera
(b) Meningococcal meningitis
(c) Plague
(d) Typhoid

Review Questions

180. **Drug of choice for carriers of typhoid is:**
(a) Ampicillin *[DNB 2002]*
(b) Chloramphenicol
(c) Co-trimoxazole
(d) Clindamycin

181. **Which is true of typhoid?** *[DNB 2008]*
(a) Female carriers are less common
(b) Male carriers though less are more dangerous
(c) Gallbladder usually not involved in carrier state
(d) Tetracycline is the DOC for carriers

182. **Typhoid oral vaccine is given:** *[UP 2008]*
(a) 1, 3, 5 days (b) 1, 2, 3 days
(c) 1, 2, 4 days (d) 1, 7, 14 days

183. **Isolation in patient with Salmonellosis is done:**
(a) Till fever subsides *[AP 2006]*
(b) Till Widal becomes negative *[UP 2002]*
(c) Till 3 stool test are negative
(d) For 48 hrs of Chloramphenicol treatment

184. **Best disinfectant for cholera stools is:** *[MP 2000]*
(a) Bleaching powder (b) Cresol
(c) Coal-tar (d) Formalin

185. **In oral rehydration solution least amount in of:**
(a) Sodium citrate *[MP 2002]*
(b) Potassium chloride
(c) Sodium chloride
(d) Glucose

WORM INFESTATIONS

186. **All of the following statements regarding dracunculiasis are true *except*:** *[AIIMS Nov 2004]*
(a) India has eliminated this disease
(b) Niridazole prevents transmission of the disease
(c) The disease is limited to tropical and subtropical regions
(d) No animal reservoir has been proved

187. **Chandlers Index is used in epidemiological studies of**
(a) Round worms *[AIIMS Dec 1998 and Nov 1993]*
(b) Hookworms *[Recent Question 2013]*
(c) Guinea worms *[UPSC CMS 2015]*
(d) Sand fly

188. **Intermediate host for Hydatid disease is:**
(a) Man *[AIIMS May 2009]*
(b) Dog
(c) Cat
(d) Fox

189. **Chandlers index for Hookworm. When it is health problem?** *[Recent Question 2013, 2014]*
(a) >300 (b) >200
(c) >100 (d) >50

190. **Chandler's index is used for:** *[DNB 2008]*
(a) Ankylostoma duodenale *[Recent Question 2014]*
(b) Ascaris lumbricoides
(c) Strongyloides
(d) Trichuris trichiura

191. **Uses of Chandler's index for hookworm include all *except*:** *[AIIMS PGMEE 2014]*
(a) Assessment of endemicity
(b) Monitoring individual treatment
(c) Monitoring mass treatment of coomunity
(d) Comparison of worm load in different populations

192. **WHO considerations regarding Dracunculosis eradication, all are true *except*:** *[Recent Question 2014]*
(a) Drinking piped water and installation of hand pumps
(b) DDT
(c) Health education and awareness of public
(d) Control of Cyclops

Review Questions

193. **Guinea worm infestation is common in workers of:**
(a) Step wells *[DNB 2000]*
(b) Ponds
(c) Fields
(d) Cotton mills

194. **According to Chandler's index water containing 200-250 eggs should be considered as:**
(a) Safe *[UP 2001]*
(b) Mild pollution
(c) Dangerous
(d) Public health problem

195. **Dracunculiasis was more common in which of the following state?** *[TN 2000]*
(a) Orissa (b) Rajasthan
(c) Tamil Nadu (d) U.P.

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196. Cysticercosis cellulosae causes infection with:
(a) Taenia saginata *[TN 2005]*
(b) Taenia solium
(c) Echinococcus granulosus
(d) Diphyllobothrium latum

197. Chandler's index is: *[Recent Question 2014] [MP 2001]*
(a) No. of eggs of hook work in 100 gram soil *[AP 2006]*
(b) No. of eggs of hookworm in per gram soil
(c) No. of eggs of hookworm in per gram stool
(d) Percentage of stool specimens positive for hookworms

DENGUE

198. Dengue shock syndrome is characterized by the following *except*: *[AIIMS Nov 1993]*
(a) Hepatomegaly
(b) Pleural effusion
(c) Thrombocytopenia
(d) Decreased hemoglobin

199. Classical dengue fever is transmitted by:
(a) Aedes mosquito *[Karnataka 2008]*
(b) Anopheles mosquito *[Recent Question 2013]*
(c) Mansonoides mosquito
(d) Culex mosquito

200. Which of the following statement is/are true about dengue: *[PGI Dec 06]*
(a) ↑ Haematocrit
(b) ↓ platelet
(c) + tourniquet test
(d) Vector Aedes aegypti usually bite during day time
(e) Pleural effusion present

201. Dengue virus appears to have a direct man-mosquito-man cycle in India. The mechanism of dengue virus survival in the inter-epidemic period is: *[DPG 2011]*
(a) Non-human reservoir
(b) Dormant or latent phase in man
(c) Transovarian transmission of the virus
(d) Poor housekeeping by the public

202. True about Dengue fever is/are: *[PGI May 2011]*
(a) Is the most common arboviral infection
(b) Can be both epidemic as well as endemic
(c) Can survive in ambient temperature
(d) Incidence decreasing in India in last 2-3 decades
(e) Vector is Aedes aegypti

203. The main vector of Dengue fever is: *[Karnataka 2011]*
(a) Aedes aegypti
(b) Aedes albopictus
(c) Aedes polynesiensis
(d) Aedes scutellaris

204. Which is not true of Dengue fever? *[NUPGET 2013]*
(a) Aedes aegypti is the principal vector
(b) Break bone fever is characteristic
(c) Serotype 4 is more dangerous than other serotypes
(d) Torniquet test is positive

205. All are true about Dengue hemorrhagic fever *except*:
(a) Lamivudine is drug of choice
(b) Malnutrition is protective
(c) Transmitted by Aedes *[AIIMS November 2014]*
(d) Causative agent belongs to Flaviviradae group

206. A 20-year-old male is diagnosed as a case of dengue fever at a Primary Health Centre. What are the suitable measures to be taken for the prevention and control of dengue in that area? *[UPSC CMS 2015]*
(a) Case management for DF and DHF and vaccination
(b) Case management for DF and DHF, isolation and individual protection from mosquitoes
(c) Case management for DF and DHF, isolation and individual protection from mosquitoes and vaccination
(d) Case management for DF and DHF, isolation and individual protection from mosquitoes and environmental measures for elimination of breeding places

Review Questions

207. Which is not true about dengue hemorrhagic fever:
(a) Thrmbocytopenia *[Bihar 2006]*
(b) Hepatomegaly
(c) Shock
(d) Plasma leaking

208. Dengue fever is transmitted by: *[AP 1999] [JIPMER 1994] [MP 2001] [UP 1997] [AP 2001]*
(a) Cluex fatigans
(b) Cluex vishnuii
(c) Aedes aegypti
(d) Glossina palpalis

209. Infective period of Aedes mosquito for Classical Dengue fever (break-bone fever) is: *[AIIMS 1988] [Karnataka 1987] [MH 1997] [Manipal 1997] [SGPGI 1996] [TN 1993, 1991] [UP 1996] [UPSC 1986] [TN 2000]*
(a) 10-20 days
(b) 20-30 days
(c) 30-40 days
(d) Lifelong

210. Which of the following statement regarding dengue is correct: *[Kolkata 2004]*
(a) Caused by 3 serotypes of dengue virus
(b) It is endemic in India
(c) Aspirin is used for treatment
(d) Clinical course of dengue is more fulminant in children than adults

MALARIA

211. API is: *[AIIMS May 1993]*
(a) Annual parasitic index
(b) Average parasitic index
(c) Animal parasite interval
(d) Annual parasitic incidence

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212. The infective form of malarial parasite through a blood transfusion is: *[AIIMS June 1997]*
(a) Trophozoite (b) merozoite
(c) Sporozoite (d) Schizont

213. The drug preferred for chloroquine resistant malaria in pregnancy is: *[AIIMS June 2000]*
(a) Mefloquine (b) primaquine
(c) Cloxacilin (d) Quinine

214. In a Chloroquine resistant zone the presumptive treatment of malaria to be given is: *[AIIMS May 02, Nov 1999]*
(a) Chloroquine + primaquine 45 mg
(b) Chloroquine + pyrimethamine
(c) Sulphalene 1000 mg
(d) Sulphadoxine + pyrimethamine

215. In high-risk areas the radical treatment for Plasmodium vivax infection after microscopic confirmation is administration of tablets primaquine in the daily dosage of: *[AIIMS May 1993]*
(a) 0.25 mg/kg body weight
(b) 0.50 mg/kg body weight
(c) 0.75 mg/kg body weight
(d) 1.00 mg/kg body weight

216. The most sensitive index of recent transmission of malaria in a community is: *[AIIMS Nov 1993, 2003, Feb 1997, AIPGME 1996]*
(a) Spleen rate *[DPG 2005, MP 2005]*
(b) Infant parasite rate *[MH 2006, JIPMER 1999]*
(c) Annual parasite incidence
(d) Slide positivity rate

217. Best indicator for malaria prevalence in a community is: *[DPG 2005]*
(a) Adult parasite rate
(b) New Cases in a community
(c) Infant parasite rate
(d) Spleen rate

218. Which of the following is used for radical cure of malaria? *[DPG 2006]*
(a) Primaquine (b) Chloroquine
(c) Quinine (d) Pyrimethamine

219. Species of Anopheles transmitting malaria is urban areas is: *[DPG 2007]*
(a) Stephensi (b) Culcifacies
(c) Minimus (d) Fluviatilis

220. The peaks of fever in malaria coincide with the release of successive broods of ……..into the blood stream:
(a) Sporozoites *[Karnataka 2008]*
(b) Trophozoites
(c) Merozoites
(d) Hypnozoites

221. Urban malaria is due to: *[PGI Dec 2K]*
(a) Anopheles stephensi
(b) Anopheles culicifacies
(c) Phlebotomus
(d) Aedes
(e) Culex vishnaui

222. True about epidemiology of malaria: *[PGI Dec 06]*
(a) Extrinsic incubation period 0-14 days
(b) In India common during January to June
(c) Man act as definitive host
(d) Rare in urban areas
(e) Mosquito acts as definitive host

223. Malaria is transmitted by: *[PGI Dec 07]*
(a) Anopheles stephensi
(b) Anopheles dirus
(c) Culex
(d) Phlebotamus

224. All of the following factors are responsible for resurgence of Malaria *except*: *[AIPGME 2011]*
(a) Drug resistance
(b) Use of bed-nets
(c) Vector resistance
(d) Mutation in parasite

225. Plasmodium ovale in India has been reported from:
(a) Maharashtra *[PGI May 2011]*
(b) Madhya Pradesh
(c) Manipur
(d) Gujarat
(e) Orrisa

226. True about Malaria in India is/ are: *[PGI November 2012]*
(a) 1.5 million cases annually
(b) Quinine drug of choice in severe malaria in pregnancy
(c) Anopheles culicifacies is vector in Urban malaria
(d) Plasmodium ovale is not seen in India
(e) Falciparum malaria is most common type

227. Propylaxis for malaria not used: *[Recent Question 2013]*
(a) Doxycycline (b) Artesunate
(c) Chloroquine (d) Mefloquine

228. Chemoprophylaxis of Malaria can be done by all *except*: *[Recent Question 2012] [Recent Question 2013]*
(a) Chloroquine (b) Mefloquine
(c) Proguanil (d) Primaquine

229. Malaria recrudescence is *[AIIMS May 2014]*
(a) Resistant to treatment
(b) Relapse of infection
(c) Relapse in vivax and ovale
(d) Reappearance of sexual stage parasitemia after treatment

230. Cycle that is seen in RBCs in malaria
(a) Sexual *[Recent Question 2014]*
(b) Sporogony
(c) Exogenous
(d) Endogenous

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231. Throughout the country every year anti-malaria month is observed during the month of *[PGMCET 2015] [UP 2005]*
(a) July
(b) January
(c) June
(d) December

Review Questions

232. Malarial parasite in India are all *except*: *[DNB 2003]*
(a) P. vivax (b) P. falciparum
(c) P. ovale (d) P. malariae

233. Incubation period of plasmodium vivax is:
(a) 5-7 days *[DNB 2004]*
(b) 7-10 days *[Recent Question 2012]*
(c) 10-14 days *[Recent Question 2013]*
(d) 15-30 days

234. If API>2, the vector is resistant to DDT, the malathion spray should be done every: *[UP 2006]*
(a) One round of malathion every month
(b) 2 round or malathion every months
(c) 1 -2 round of malathion every 3 months
(d) 3 round of malathion every 3 months

235. A malarial survey is conducted in 50 villages having a population of 1 lakh. Out of 20000 slides examined, 500 turned out to be malaria positive. The annual parasite incidence is: *[Kolkata 2008]*
(a) 20 (b) 5
(c) 0.5 (d) 0.4

236. What is causative organism for Malaria?
(a) Plasmodium *[MP 2006]*
(b) Anopheles
(c) Culex
(d) Yersinia

237. Goal of reduction in morbidity and mortality due to malaria by 2010 is: *[MP 2009]*
(a) 25% reduction
(b) 50% reduction
(c) 75% reduction
(d) 100% reduction

238. Malaria is transmitted by: *[MH 2000]*
(a) Female anopheles mosquito
(b) Male anopheles mosquito
(c) Culex mosquito
(d) Aedes mosquito

239. Among various species of mosquitoes belonging to anopheles genus, one that is highly anthrophilic and transmits even at low density is: *[MH 2003]*
(a) Anopheles sundicans
(b) Anopheles fluvitalis
(c) Anopheles stephensi
(d) Anopheles culicifacies

LYMPHATIC FILARIASIS

240. DEC is used extensively in the chemotherapy of Filariasis. It is most effective against:
(a) Microfilariae *[AIIMS May 1993]*
(b) Adult worm
(c) Infective stage larvae
(d) All of the above

241. The organism most commonly causing genital filariasis in most parts of Bihar and Eastern U.P. is:
(a) Wuchereria bancrofti
(b) Brugia malayi
(c) Onchocerca volvulus
(d) Dirofilaria

242. The currently given regimen for Bancroftian filariasis is: *[AIPGME 1991]*
(a) DEC – 6 mg/ Kg / day × 21 days
(b) DEC – 6 mg/ Kg / day × 12 days
(c) DEC – 100 mg/ day × 21 days
(d) DEC – 100 mg/ day × 12 days

243. The vector for transmission of Bancroftian filaria is:
(a) Culex fatigans *[Karnataka 2005]*
(b) Aedes aegypti
(c) Mansonoides annulifers
(d) Anopheles stephensi

244. The DEC-medicated salt for mass treatment in lymphatic filariasis was shown to be safe, cheap and effective in: *[Karnataka 2008]*
(a) Goa
(b) Daman and Diu
(c) Andaman and Nicobar islands
(d) Lakshadweep islands

245. All of the following are helpful for elimination of filariasis, *except*: *[AIIMS PGMEE May 2012]*
(a) Microfilariae do not multiply in vectors
(b) They multiply in humans
(c) Larvae are deposited on skin surface where they can't survive
(d) Mass drug administration

246. All of the following are true about filariasis *except*: *[DNB December 2011]*
(a) It is sheathed
(b) Tail end is free from nuclei and unsheathed
(c) Has nocturnal activity
(d) Day time resides inside the lymphatics

Review Questions

247. Life cycle of filarial in the mosquito is described as:
(a) Cyclopropagative *[AP 2005]*
(b) Cyclodevelopmental
(c) Propagative
(d) None

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248. The Clinical incubation period of Filariasis is:
(a) 10 to 20 days *[TN 2003]*
(b) 3 to 6 months
(c) 6 to 12 months
(d) 8 to 16 months

249. Target year for elimination of lymphatic filariasis:
(a) 2010 *[Kolkata 2008]*
(b) 2015
(c) 2020
(d) 2012

RABIES

250. Pre-exposure prophylaxis for Rabies is given on:
(a) Days 0, 3, 7, 14, 28, 90 *[AIPGME 96, AIPGME 98]*
(b) Days 0, 3, 7, 28, 90 *[Recent Questions 2014]*
(c) Days 0, 3
(d) Days 0, 7, 28

251. Class II exposure in animal bites includes the following: *[AIPGME 2003]*
(a) Scratches without oozing of blood
(b) Licks on a fresh wound
(c) Scratch with oozing of blood on palm
(d) Bites from wild animals

252. For the treatment of case of class III dog bite, all of the following are correct *except*: *[Recent Question 2013]*
(a) Give Immunoglobulins for passive immunity
(b) Give ARV *[AIPGME 2005]*
(c) Immediately stitch wound under antibiotic coverage
(d) Immediately wash wound with soap and water

253. Which of the following statements about rabies is FALSE? *[DPG 2004]*
(a) Convulsions are generally not seen in a patient with rabies
(b) Presence of meningitis suggests against the diagnosis of rabies
(c) Intracytoplasmic basophilic inclusion bodies are seen in brain cells
(d) Incubation period is approximately 20 to 80 days

254. Which of the following should be injected in and around the wound in class III rabies bite?
(a) Tetanus toxoid *[DPG 2006]*
(b) Antibiotic solution
(c) Anti rabies serum
(d) None of the above

255. Rabies in not found in: *[DPG 2006]*
(a) Lakshadweep Islands (b) Rajasthan
(c) Meghalaya (d) Orrisa

256. Bite of which of the following animals do not result in human rabies? *[DPG 2007]*
(a) Dog (b) Mouse
(c) Horse (d) Cat

257. Characteristic features of Rabies include all *except*: *[NUPGET 2013]*
(a) Can manifest as ascending paralysis
(b) Hematogenous spread to brain
(c) Can be transmitted by bites other than dogs also
(d) In invariably fatal

258. Schedule of intradermal rabies vaccine is? *[Recent Question 2013]*
(a) 2-2-0-1-0-1 (b) 8-0-4-0-1-1
(c) 8-4-4-1-0-1 (d) 2-0-2-0-1-1

259. Number of does of Rabies HDCV vaccine required for pre-exposure prophylaxis: *[Recent Question 2013]*
(a) 5 (b) 2
(c) 3 (d) 1

260. Which virus is used to produce rabies vaccine? *[Recent Question 2013]*
(a) Wild (b) Street
(c) Fixed (d) Live Attenuated

261. Intermediate host of Rabies is *[Recent Question 2014]*
(a) Man
(b) Dog
(c) Cow
(d) Rat

262. A 10-year-old child with unprovoked Dog bite comes to you. Appropriate action is *[AIIMS PG May 2015]*
(a) Withhold vaccine and observe dog for 10 days
(b) Give cell culture derived vaccine
(c) No further action is necessary
(d) Kill the dog and send brain for biopsy

263. For the prevention of human rabies, immediate flushing and washing the wound(s) in animal bite cases, with plenty of soap and water, under running tap should be carried out for how much time? *[PGMCET 2015]*
(a) 2 minutes
(b) 1 minute
(c) 15 minutes
(d) 5 minutes

Review Questions

264. Rabies free country is: *[DNB 2000]*
(a) China (b) Russia
(c) Australia (d) France

265. Rabies free country is: *[DNB 2004, 05]*
(a) China (b) Russia
(c) Britain (d) France

266. All these Rabies vaccines are commercially available *except*: *[UP 2000]*
(a) Killed sheep brain
(b) Human diploid vaccine
(c) Vero-continuous cell vaccine
(d) Recombinant glycoprotein vaccine

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267. A patients present with dogs bite in the palm fingers and oozing of blood on the neck regions, belongs to which class of the exposures:
(a) Class I *[UP 2008]*
(b) Class II
(c) Class III
(d) None

268. All are true about rabies *except*: *[MP 2000]*
(a) It is a DNA virus
(b) Vaccine virus has fixed incubation period
(c) Incubation period depends upon site of bite
(d) All bites on fingers with laceration are class III injuries

269. Nervous tissue Rabies vaccines are usually manufactured from: *[MP 2007]*
(a) Sheep
(b) Human diploid cell
(c) Duck embryos
(d) Chick embryos

270. Rabies does not occur in which of the following parts of India? *[MH 2003]*
(a) Daman and Diu
(b) Andaman and Nicobar Islands
(c) Dadra and Nagar Havelli
(d) Pondicherry

271. In the case of dog bite the biting animal should be observed for at least: *[RJ 2007]*
(a) 5 days (b) 10 days
(c) 15 days (d) 3 weeks

YELLOW FEVER

272. The incubation period of yellow fever is:
(a) 3 to 6 days *[AIIMS May 04]*
(b) 3-4 weeks
(c) 1 to 2 weeks
(d) 8-10 weeks

273. All are features of yellow fever *except*:
(a) Sub clinical cases present *[AIIMS June 1997]*
(b) Fatality rate > 90%
(c) One attack gives life long immunity
(d) Hepatic and renal involvement in severe cases

274. According to International Health Regulations, there is no risk of spread of yellow Fever if the Aedes aegypti index remains below: *[AIPGME 2004]*
(a) 1% (b) 5% *[Recent Question 2013]*
(c) 8% (d) 10%

275. All are true for Yellow Fever *except*:
(a) Causative agent is Flavivirus fibricus
(b) Case fatality is up to 80 % *[AIPGME 2003]*
(c) Validation of Vaccination Certificate begins after 10 days and lasts till 10 years
(d) Incubation period is 16-46 days

276. Vaccine of yellow fever is: *[DPG 2006]*
(a) 4D (b) 5D
(c) 2D (d) 17D

277. True about yellow fever: *[PGI June 04]*
(a) I.P. is 10-14 days
(b) Transmitted by Aedes
(c) It is found in Asia
(d) Incidence is increased by humidity
(e) It is a flavivirus

278. Yellow fever certificate of vaccination is valid for: *[Recent Question 2012]*
(a) 1 year *[UP 2001]*
(b) 10 years
(c) 35 years
(d) Lifelong

279. Yellow fever vaccination starts protection after how many days of injection: *[DNB 2007]*
(a) 5 day *[Recent Questions 2014]*
(b) 10 days *[DNB 2001]*
(c) 15 days
(d) 20 days

280. Which is not true about Yellow fever? *[Recent Question 2013]*
(a) Exotic
(b) Incubation period 2-6 days
(c) Validity of vaccine 6 years
(d) Live Attenuated 17 D strain vaccine

281. To prevent yellow fever Aedes aegypti index should be less than……. *[DNB December 2010] [DNB December 2011]*
(a) 0.5% (b) 1%
(c) 2% (d) 5%

282. Yellow fever certificate of vaccination is valid for: *[DNB December 2010]*
(a) 6 years, starting from 6 days after vaccination
(b) 10 years, starting from 10 days after vaccination
(c) 10 years, starting from 6 days after vaccination
(d) 6 years, starting from 10 days after vaccination

283. All are true about Yellow Fever *except*: *[AIIMS Nov 1999]*
(a) Incubation period is 3-6 days
(b) Validity of Int'l certificate of Vaccination lasts up to 10 years
(c) Urban form is controlled by 17 D vaccine
(d) Aedes aegypti index should not be more than 10% to ensure freedom from yellow Fever

Review Questions

284. Which act was passed in 20th century: *[MP 2004]*
(a) Birth and death registration act
(b) Drug act
(c) Epidemic disease act
(d) Quarantine act

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285. Which if the following is the 'YELLOW FEVER' reference centre? *[MH 2008]*
(a) Haffkin's institute, Mumbai
(b) Central institute, kasauli
(c) NIN, Hyderabad
(d) AIIMS, Delhi

JAPANESE ENCEPHALITIS

286. All are true about Japanese Encephalitis except: *[AIPGME 1996, Dec 98, AIIMS May 97]*
(a) Man is incidental dead-end host
(b) Culicines and anophelines are vectors involved
(c) Case fatality rate is over 90%
(d) 85% of cases occur in children <15 years age

287. True statement regarding Japanese Encephalitis is: *[AIPGME 2011]*
(a) 70% of cases are reported from infants
(b) Ratio of clinical apparent to non-apparent infections is 1:100
(c) Mosquito bite is always associated with the disease
(d) Epidemic is declared if there are 2-3 cases in a village

288. JE virus life cycle in nature run between? *[Recent Question 2013]*
(a) Pigs-Mosquito (b) Cattle-Birds
(c) Pigs-human (d) Bird-Pigs

289. Amplifier for Japanese encephalitis: *[Recent Question 2013]*
(a) Horse (b) Pigs
(c) Dogs (d) Monkey

290. Japanese encephalitis is transmitted by: *[DNB December 2010] [DNB June 2011] [Recent Question 2012]*
(a) Culex (b) Aedes *[UP 2001]*
(c) Mansonia (d) Anopheles

291. Which of the following is not true regarding Japanese encephalitis vaccine? *[AIIMS PG May 2015]*
(a) Booster doses are given after 1 year and repeated every 3 years
(b) Not given for infants less than 6 months age
(c) Two primary doses given to children aged 1-3 years age
(d) In endemic areas, vaccination is given to cover children 1-9 years age

Review Questions

292. Not true about Japanese's encephalitis is:
(a) Man to man transmission *[Bihar 2006]*
(b) Vector is culex. tritaeniorhynchus
(c) Rice field
(d) Horse shows symptom

293. Major determinant to eradication of Japanese encephalitis is: *[RJ 2007]*
(a) No effective vaccine
(b) Breeding place of vector
(c) Large no. of in apparent infections
(d) Numerous animal hosts

KFD

294. Which of these is NOT useful in the prevention of KFD? *[AIIMS May 2001]*
(a) Vaccination
(b) Deforestation
(c) Prevention of roaming cattle
(d) Personal protection

295. The vector for KFD is: *[AIIMS May 1993]*
(a) Aedes aegypti
(b) Haemaphysalis
(c) Culex
(d) Xenopsylla

296. Kyasanur forest disease in transmitted by:
(a) Mosquito *[DPG 2006]*
(b) Housefly *[WB 2008]*
(c) Rat flea *[MP 2000]*
(d) Hard tick

PLAGUE

297. All are true about Plague *except*:
(a) Domestic rat "Rattus rattus" has been incriminated as main reservoir *[AIPGME 1997]*
(b) Both sexes of rat flea bite to transmit the disease
(c) IP for bubonic plague is 1-3 days
(d) Infants under 6 months are not given the killed vaccine

298. The most effective method to break transmission chain in plague is: *[AIIMS May 2002]*
(a) Early diagnosis and treatment
(b) Control of fleas
(c) Control of rodents
(d) Vaccination

299. All of the following statements about plague is wrong, *except*: *[AIIMS May 2004]*
(a) Domestic rat is the main reservoir
(b) Bubonic is the most common variety
(c) The causative bacillus can survive up to 10 years in the soil of rodent burrows
(d) The incubation period for pneumonic plague is one to two weeks

300. Plague epidemic in Surat in 1995 has occurred after a silence period of: *[DPG 2005]*
(a) 18 years
(b) 20 years
(c) 28 years
(d) 30 years

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301. Maximum Explosiveness of Plague is determined by:
(a) Total flea index *[DPG 2006]*
(b) Cheopsis index *[Recent Question 2013]*
(c) Borrow index
(d) Specific percentage of fleas

302. Severity of spreading of plague detected by:
(a) Burrow's index *[DNB December 2011]*
(b) Cheopsis index
(c) Specific flea index
(d) Total flea index

Review Questions

303. Cheopsis index is the: *[AP 2003]*
(a) Average number of cheopis per rat
(b) Average number of fleas per rat
(c) Average number of fleas per burrow
(d) Average number of cheopis per burrow

304. The highly infections clinical form of plague is:
(a) Bubonic plague *[TN 2003]*
(b) Pneumonic plague
(c) Septicaemic plague
(d) All of the above

305. Dose of equine anti-rabies immunoglobulin (ERIG) is: *[MP 2005]*
(a) 20 IU per kg of body weight
(b) 10 IU per kg of body weight
(c) 40 IU per kg of body weight
(d) 30 IU per kg of body weight

306. Plague is transmitted by: *[RJ 2001]*
(a) Hard tick *[Recent Question 2013]*
(b) Soft tick
(c) Rat flea
(d) Louse

RICKETTSIAL DISASES

307. Which of the following pairs of 'Rickettsial Diseases–Insect vectors' is wrongly matched ? *[AIPGME 96]*
(a) Epidemic typhus – Louse
(b) Scrub typhus - Flea
(c) Rocky Mountain spotted fever - Tick
(d) Rickettsial pox - Mite

308. A patient complained of chills and fever following a louse bite 2 weeks before. He had rashes all over the body and was delirious at the time of presentation to the hospital and subsequently went into coma. A provisional diagnosis of vasculitis due to Rickettsial infection was made. Which one of the following can be the causative agent? *[AIPGME 2006]*
(a) Rickettsia typhi
(b) Rickettsia rickettsiae
(c) Rickettsia prowazekii
(d) Rickettsia akari

309. It is true regarding endemic typhus that:
(a) Man is the only reservoir of infection
(b) Flea is a vector of the disease *[AIPGME 07]*
(c) The rash developing into eschar is a characteristic presentation
(d) Culture of the aetiological agent in tissue culture is diagnostic modality

310. Mode of transmission of Q fever is:
(a) Bite of infected louse *[AIIMS May 04]*
(b) Bite of infected tick *[DNB 2008]*
(c) Inhalation of aerosol
(d) Bite of infected mite

311. A man presents with fever and chills 2 weeks after a louse bite. There was a maculo-papular rash on the trunk which spread peripherally. The cause of this infection can be: *[AIIMS May 2003]*
(a) Scrub typhus
(b) Endemic typhus
(c) Rickettsial pox
(d) Epidemic typhus

312. All of following statements are true regarding Q fever *except*: *[AIIMS May 2003, AIPGME 1996]*
(a) It is a zoonotic infection
(b) Human disease is characterized by an interstitial pneumonia
(c) No rash is seen
(d) Weil Felix reaction is very useful for diagnosis

313. R. Rickettsii causes: *[AIPGME 1996]*
(a) Indian tick typhus
(b) Rocky mountain spotted fever
(c) Rickettsial pox
(d) Trench fever

314. All are true about Scrub typhus *except*:
(a) Mite is a vector *[AIPGME 2010]*
(b) Adult mite feeds on vertebral host
(c) Caused by R. tsutsugamushi
(d) Tetracycline is treatment

315. Rickettsiae are transmitted by: *[PGI May 2011]*
(a) Flea (b) Louse
(c) Mosquito (d) Mite
(e) Fly

316. Epidemic typhus causes & vector: *[Recent Question 2013, 2015]*
(a) Rickettessia prowazki & louse *[DNB 2010]*
(b) R. typhi & mite
(c) R. conori & tick
(d) R. akari & mite

317. Vagabond disease transmitted by: *[Recent Question 2013]*
(a) Louse (b) Mite
(c) Tick (d) Black Fly

318. Rickettsial pox is caused by: *[DNB December 2009]*
(a) Rickettsia ricketsiae (b) Rickettsia akari
(c) R. typhi (d) Rickettsia conori

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319. Endemic typhus is transmitted by: *[DNB December 2009]*
(a) Flea (b) Tick *[Recent Question 2012]*
(c) Mite (d) Mosquito *[UP 2006]*

Review Questions

320. Scrub typhus is transmitted by: *[DNB 2006]*
(a) Flea *[Recent Question 2013]*
(b) Mite *[RJ 2000]*
(c) Tick
(d) Mosquito

321. R. prowazekii is transmitted by: *[UP 2001]*
(a) Flea (b) Louse
(c) Mite (d) Tick

322. Rickettsial agent of Epidemic typhus is:
(a) R. prowazekii *[UP 2005]*
(b) R. typhi
(c) R. tsutsugamushi
(d) R. canorii

323. Organism that does not need vector for transmission:
(a) Rickettsia prowazekii *[Kolkata 2005]*
(b) Rickettsia rickettsii
(c) Coxiella burnetii
(d) Borrelia recurrentis

324. Trombiculid mite can transmit: *[MP 2004]*
(a) Indian tick typhus
(b) Scrub typhus
(c) Relapsing fever
(d) Q. fever

325. Arthropods are vector for all *except*: *[MH 2007]*
(a) Scrub typhus
(b) Epidemic typhus
(c) Q-fever
(d) Rocky mountain sportted fever
(d) Flea

326. Rash starting peripherally is a feature of: *[RJ 2007]*
(a) Epidemic types
(b) Endemic Typhus
(c) Scrub typhus
(d) Indian tick typhus

327. Rash is absent in: *[RJ 2008]*
(a) Epidemic types
(b) Endemic typhus
(c) Scrub typhus
(d) Q-fever

LEISHMANIASIS

328. False about Leishmaniasis is: *[AIPGME 2003]*
(a) Co-infection with AIDS is now emerging
(b) Indian Leishmaniasis is a non-zoonotic infection with man as the sole reservoir
(c) Aldehyde Test of Napier is a good test for diagnosis
(d) There are no drugs for personal prophylaxis

329. Reservoir of Indian Kala-azar is: *[AIIMS May 03]*
(a) Man (b) Rodent
(c) Canine (d) Equine

330. All are used in treatment of Visceral Leishmaniasis *except*: *[AIIMS Nov 2009]*
(a) Sitamaquine
(b) Paramomycin
(c) Hydroxychloroquine
(d) Miltefosine

Review Questions

331. Kala-azar is transmitted by: *[TN 2005]*
(a) Phlebotomus sergenti
(b) Phlebotomus papatasii
(c) Phlebotomus argentipes
(d) All of the above

332. All the following statements are true for Indian Kala-azar *except*: *[MP 2009]*
(a) It is transmitted by the bite of an infected sandfly
(b) Dog is the reservoir of infection
(c) The causative parasite is cultivated in the NNN medium
(d) The disease is endemic in Bihar

333. Not true about Kala-Azar is: *[RJ 2007]*
(a) Sandfly is the vector
(b) Man is the only reservoir host in India
(c) Aldehyde test is positive
(d) Man has flagellar stage of organism

TRACHOMA

334. SAFE strategy include all the following EXCEPT:
(a) Screening *[AIIMS Nov 2006]*
(b) Antibiotics
(c) Face washing
(d) Environmental improvement

335. True about Trachoma is: *[AIPGME 1996]*
(a) Is a disease of high infectivity
(b) Prevalence of severe and moderate trachoma in > 1 % in children less than 10 yrs is indication for mass treatment
(c) Irritants like kajal or surma also predispose
(d) Is a non-avoidable cause of blindness in India

336. For the field diagnosis of trachoma, the WHO recommends that follicular and intense trachoma inflammation should be assessed in: *[AIIMS May 2003]*
(a) Women aged 15-45 years
(b) Population of 10 to 28 year range
(c) Children aged 0-10 years
(d) Population above 25 years of age irrespective of sex

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337. In the grading of Trachoma, Trachomatous Inflammation-follicular is defined as the presence of: *[AIPGME 2004]*
(a) Five or more follicles in the lower tarsal conjunctiva
(b) Three or more follicles in the lower tarsal conjunctiva
(c) Five or more follicles in the upper tarsal conjunctiva
(d) Three or more follicles in the upper tarsal conjunctiva

338. Mass treatment of trachoma is undertaken, when the prevalence is more than: *[DPG 2005]*
(a) 3% (b) 5%
(c) 6% (d) 10%

339. Lowest incidence of trachoma is in: *[DPG 2011]*
(a) Punjab (b) Rajasthan
(c) Uttar Pradesh (d) Orissa

340. Azithromycin mass treatment is given in community when prevalence of Trachoma is more than:
(a) 4% *[AIIMS November 2011]*
(b) 6%
(c) 8%
(d) 10%

341. Trachoma screening is done on which of the following age-groups? *[AIIMS PGMEE November 2012]*
(a) <5 years
(b) 5-10 years
(c) 5-15 years
(d) 1-9 years

342. Single drug treatment recommended for Trachoma control in India is *[Recent Question 2014]*
(a Azithromycin
(b) Tetracycline
(c) Erythromycin
(d) Penicillin

TETANUS

343. A person has received complete immunization against tetanus 10 years ago, now he presents with a clean wound without any lacerations from an injury sustained 3 hours ago. He should now be given
(a) Full course of tetanus toxoid *[AIPGME 01]*
(b) Single dose of tetanus toxoid *[Recent Question 2013]*
(c) Human tetanus globulin
(d) Human tetanus globulin and single dose of toxoid

344. Neonatal Tetanus is said to be eliminated when the rate is: *[AIIMS Feb 1997]*
(a) > 10 per 1000 LB *[Recent Question 2013]*
(b) > 1 per 1000 LB *[DNB 2008]*
(c) < 1 per 1000 LB
(d) < 0.1 per 1000 LB

345. All the following are done to prevent tetanus neonatorum except: *[AIPGME 2007]*
(a) Two TT doses to all pregnant women
(b) TT to all females in reproductive age group
(c) TT to all newborns
(d) Injection penicillin to all neonates

346. All of the following statements are true about Clostridium tetani infection *except*: *[AIIMS Nov 2010]*
(a) Main reservoir is soil, animal intestine and human intestine
(b) Main mode of transmission is through trauma and contaminated wound
(c) Herd immunity does not have much value
(d) Seen commonly in winter and dry climate

347. All are true regarding Clostridium tetani infection *except*: *[AIPGME 2011]*
(a) Incubation period 6-10 days
(b) 3 primary doses of vaccine required for full protection
(c) Man-to-man transmission
(d) Produces heat-resistant spores

348. An adult, previously unimmunized against Tetanus presents with a clean non-penetrating wound sustained 2 hours previously. What tetanus prophylaxis is advised? *[Karnataka 2011]*
(a) Only through cleaning of wound
(b) Tetanus toxoid 1 dose
(c) Tetanus toxoid complete course
(d) Tetanus toxoid complete course + human tetanus immunoglobulin

349. True about Tetanus is all *except*: *[AIIMS PGMEE November 2012]*
(a) Tetanus protection 5 years if previously immunized
(b) Herd immunity present
(c) Can't be eradicated
(d) Elimination is less than 1 case per 1000 live births

Review Questions

350. The period of communicability of Tetanus is:
(a) 7 days *[UP 2007, RJ 2001]*
(b) 14 days
(c) 21 days
(d) None

351. A person had clean non-penetrating wound four hours back. He had a complete course of toxoid eleven years ago. What treatment is recommended? *[MP 2009]*
(a) No toxoid is required
(b) Toxoid one dose
(c) Toxoid complete course
(d) Toxoid complete course+Human tetanus Ig

352. Indicators of the Elimination of NEONATAL TETNUS includes the following *except*? *[MH 2008]*
(a) Incidence rate <0.1/1000 live births
(b) > 90% coverage of 3 antenatal visits
(c) TT2 injection coverage in pregnant mothers > 90%
(d) None

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LEPROSY

353. False about Leprosy is: *[AIPGME 1991]*
(a) It has been eliminated from India
(b) It can be transmitted through breast milk
(c) Lepromin Test is not a diagnostic test
(d) MDT is contraindicated during pregnancy

354. Leprosy can be transmitted through all except: *[AIIMS 1991] [AIPGME 2004]*
(a) Mother to child (b) Breast milk
(c) Insect vectors (d) Tattooing needles

355. Leprosy is considered a public health problem if the prevalence of leprosy is more than: *[AIPGME 03, AIIMS Dec 1998]*
(a) 1 per 10,000 (b) 2 per 10,000
(c) 5 per 10,000 (d) 10 per 10,000

356. In the management of leprosy, Lepromin test is most useful for: *[AIPGME 2003]*
(a) Herd Immunity
(b) Prognosis
(c) Treatment
(d) Epidemiological investigations

357. Which of the following statements about lepromin test is not true? *[AIIMS Sep 1996, May 2006]*
(a) It is negative in most children in first 6 months of life
(b) It is a diagnostic test
(c) It is an important aid to classify type of leprosy disease
(d) BCG vaccination may convert lepromin reaction from negative to positive

358. A patient with leprosy had slightly erythematous, anesthetic plaques on the trunk and upper limbs. He was treated with paucibacillary multidrug therapy (PB-MDT) for 6 moths. At the end of 6 months, he had persistent erythema and induration in the plaque. The next step of action recommended by the World Health Organization (WHO) in such a patient is: *[AIIMS May 2001]*
(a) Stop antileprosy treatment
(b) Continue PB-MDT till erythema subsides
(c) Biopsy the lesion to document activity
(d) Continue Dapsone alone for another 6 months

359. In the management of leprosy, Lepromin test is not useful for: *[AIIMS Nov 2008, AIPGME 1991]*
(a) Diagnosis (b) Prognosis
(c) Confirmation of classification
(d) Evaluation of cell mediated immunity

360. All of the following statements about leprosy are true *except*: *[AIPGME 2004]*
(a) Multibacillary leprosy is diagnosed when there are more than 5 skin patches
(b) New case detection rate is an indicator for incidence of leprosy
(c) A defaulter is defined as a patient who has not taken treatment for 6 months or more
(d) The target for elimination of leprosy is to reduce the prevalence to less than 1 per 10,000 population

361. All of the following are tests used to detect Cell mediated immunity in Leprosy *except*:
(a) Lepromin Test *[AIIMS Feb 1997]*
(b) Lymphocyte Transformation Test
(c) Leucocyte Migration Inhibition Test
(d) FLA-ABS Test

362. Erythema Nodosum Leprosum (ENL) occurs: *[Karnataka 2007]*
(a) Due to Lepromin test reaction
(b) In those with tuberculoid leprosy
(c) As a reaction to multi drug therapy
(d) In those with lepromatous leprosy

363. True about leprosy in India: *[PGI June 05]*
(a) Prevalence decreasing in past decade
(b) Incidence highest in 1-5 yrs age group
(c) Highly pathogenic
(d) Highly communicable

364. True about epidemiology of leprosy: *[PGI Dec 08]*
(a) If high prevalence of cases seen in childhood, it means disease is under control
(b) Lepra bacilli cannot survive outside human body
(c) Bacterial load is high in tuberculoid variety
(d) Insect can transmit the disease
(e) Relapse rate is indictor of efficacy of the drug

365. Which of the following about lepromin test is not true?
(a) It is negative in most children in first six months
(b) It is a diagnostic test *[AIIMS May 2010]*
(c) It is an important aid to classify type of leprosy disease
(d) BCG vaccination may convert lepra reaction from negative to positive

366. Elimination of leprosy is defined as prevalence: *[Recent Question 2012] [Recent Question 2013]*
(a) < 1 per 1000 (b) < 1 per 10000
(c) < 1 per 100,000 (d) < 1 per 100

367. Leprosy is not yet eradicated because: *[AIIMS PGMEE May 2012]*
(a) No effective vaccine
(b) Highly infectious but low pathogenicity
(c) Only humans are reservoir
(d) Long incubation period

368. As per WHO, leprosy is a public health problem if prevalence is more than: *[DNB 2008]*
(a) 0.1% (b) 0.01%
(c) 0.5% (d) 1%

369. Prevalence of leprosy in India per 10,000 is? *[DNB June 2011]*
(a) >1 (b) 0.88
(c) 0.71 (d) 0.69

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370. Generation time for leprosy bacillus is: *[DNB December 2011]*
(a) 8–10 days (b) 10–12 days
(c) 12–15 days (d) 15–20 days

371. Erythema nodosum is seen in treatment of which type of leprosy? *[DNB December 2011]*
(a) Borderline leprosy (b) Lepromatous leprosy
(c) Tuberculoid leprosy (d) None of the above

372. "Multibacillary" is a spectrum of disease, seen in: *[Recent Question 2013]*
(a) Leprosy (b) TB
(c) Tetanus (d) Trachoma

373. Ridley Jopling Leprosy classification is a type of: *[AIIMS PGMEE May 2013]*
(a) Clinical, bacteriological, Immunological, epidemiological classification
(b) Clinical, bacteriological, Immunological, therapeutic classification
(c) Clinical, bacteriological, Immunological, histological classification
(d) Operational classification

374. Lepromin test is used for all of the following except: *[NUPGET 2013]*
(a) Classify the lesions of leprosy patients
(b) Determine the prognosis of disease
(c) Assess the resistance of individuals to leprsoy
(d) Diagnosis of leprosy

375. True regarding Leprosy *[PGI November 2014]*
(a) Clofazimine included in treatment regimen
(b) Any positive smear 1+ is MBL
(c) Grenz zone in Lepromatous spectrum
(d) All deformity cases are MBL
(e) MBL recommended treatment for 12 months duration

376. 4 Split skin smears of a single patient Two samples with 10 bacilli out of 100 hpf and 2 samples with >1000 bacilli out of average fields Bacteriological index? *[Recent Question 2015]*
(a) 3.5
(b) 4.5
(c) 5.5
(d) 6.5

Review Questions

377. Mistuda reaction is read at: *[DNB 2004]*
(a) 3rd day (b) 10th day
(c) 21th day (d) 45th day

378. Leprosy commonly spreads by: *[DNB 2006]*
(a) Milk (b) Droplet
(c) Water (d) Mosquitoes

379. In multibacillary leprosy, the follow up examination after adequate Rx should be done yearly for: *[DNB 2008]*
(a) 3 years (b) 5 yrs
(c) 10 years (d) 2 years

380. Most common nerve involved in leprosy: *[Bihar 2004]*
(a) Ulnar N
(b) Common peroneal N
(c) Median N
(d) Radial N

381. Treatment of leprosy a/c to WHO is done by all drugs, *except*: *[Bihar 2005]*
(a) Dapsone (b) Clofazimine
(c) Ciprofloxacin (d) Rifampicin

382. Which of the following is true statement about leprosy: *[PGI 1998] [UP 2004]*
(a) Two plus (2+) indicates 2 different site
(b) 7 sites are needed
(c) Paucibacillary leprosy bacterial index is less than 2
(d) Various sites needed

383. In paucibacillary leprosy the single drug dapsone is continue for: *[UP 2008]*
(a) 9 days (b) 90 days
(c) 180 days (d) 10 days

384. Lepromin test is valuable for: *[MP 2001]*
(a) Diagnosis of disease
(b) Prognosis of disease
(c) Repsonse to treatment
(d) To test humoral immunity

385. In Leprosy 1+ bacterial index indicates:
(a) <100 baciHi per high power field *[MP 2003]*
(b) No bacilli in 100 high power fields
(c) 1 or less than one bacillus in each hpf
(d) Bacilli in all fields

386. Only objective way of monitoring the benefits of treatment of leprosy is: *[MP 2005]*
(a) Lepromin test
(b) Morphology index
(c) Histamine test
(d) Bacteriological index

387. Lepromin test is used for all the following *except*:
(a) It determines the type of leprosy *[MP 2009]*
(b) It confirms diagnosis of leprosy
(c) It monitors leprosy patients is treatment with chemotherapy
(d) It evaluates host resistance to leprosy

388. Which of the following types of leprosy by Indian classification of Leprosy is not included in Madrid classification? *[MH 2003]*
(a) Indeterminate leprosy
(b) Borderline type
(c) Tuberculoid leprosy
(d) Pure neuritic type

389. In multi-bacillary leprosy, bacterial index is more than:
(a) 1 *[RJ 2005]*
(b) 2
(c) 5
(d) 10

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390. Which of the following measurements indicates whether leprosy cases are being detected early or not? *[RJ 2007]*
(a) New case detection rate
(b) Proportion of children among new cases
(c) Proportion of new cases with disability
(d) Prevalence rate of disease

391. Duration of MDT (Multidrug Therapy) to resolve paucibacillary leprosy is: *[RJ 2007]*
(a) 6 month (b) 8 month
(c) 9 month (d) 12 month

HIV

392. The commonest mode of transmission of AIDS in India (in descending order) is: *[AIPGME 2002]*
(a) Transplacental, homosexual, heterosexual
(b) Homosexual, heterosexual, transplacental
(c) Heterosexual, transplacental, homosexual
(d) Heterosexual, homosexual, transplacental

393. In which of the Indian states the maximum number of AIDS cases has been reported till now?
(a) Delhi *[AIIMS Nov 2004]*
(b) Kerala
(c) Tamil Nadu
(d) Bihar

394. World AIDS day is on: *[DPG 2006]*
(a) 1st May (b) 31st October
(c) 1st December (d) 29th May

395. The first country in the South East Asian Region (SEAR) to report AIDS was: *[Karnataka 2007]*
(a) Sri Lanka (b) India
(c) Thailand (d) Bangladesh

396. The most common mode of HIV transmission in India is: *[Karnataka 2005]*
(a) Blood transfusion
(b) Mother to child transmission
(c) Sexual transmission
(d) Use of unsterile syringes and needles

397. The highest number of AIDS cases in India have occurred in the age group of: *[Karnataka 2005]*
(a) 0-14 years (b) 15-29 years
(c) 30-44 years (d) Above 45 years

398. WHO Stage IV HIV includes all *except*: *[AIIMS May 2009]*
(a) Toxoplasmosis
(b) Pneumocystis carinii
(c) HIV wasting syndrome
(d) Oral thrush

399. Major signs for AIDS case definition according to WHO are: *[PGI June 03]*
(a) Generalised lymphadenopathy
(b) Prolong fever more than 1 month
(c) Prolong cough for > 1 month
(d) Chronic diarhoea > 1 month
(e) Weight loss > 10%

400. Regarding Epidemiology of HIV True is:
(a) Mother to Child Transmission is 25%
(b) Seminal Secretion are highly Infectious than vaginal Secretion
(c) Infectious in window Period
(d) Southern Africa have 72% of total global burden
(e) Children rarely affected

401. Which of the following is used to prevent transmission of HIV from an infected pregnant mother to newborn child? *[AIIMS November 2011]*
(a) Lamivudine (b) Nevirapine
(c) Stavudine (d) Didanosine

402. Risk of mother to child HIV transmission in pregnant woman at the time of delivery, and after delivery in non breast feeding woman is:
(a) 5-10% *[AIIMS PGMEE November 2013]*
(b) 10-15%
(c) 15-30%
(d) More than 50%

403. HIV post exposure prophylaxis should be started within: *[Recent Question 2012]*
(a) 24 hours
(b) 48 hours
(c) 72 hours (d) 6 hours

404. Criteria included in AIDS Surveillance definition include: *[PGI November 2012]*
(a) Extrapulmonary TB (b) Cryptococcosis
(c) Candidiasis (d) Leptospirosis
(e) Kaposi sarcoma

405. HIV transmission Mother to child can be stopped by all except: *[AIIMS PGMEE May 2013]*
(a) Caesarean section
(b) Vitamin A supplementation
(c) Stopping Breast feeding
(d) Zidovudine to mother antenatal and newborn after delivery

406. MC subtype of HIV in India is: *[Recent Question 2013]*
(a) HIV-A (b) HIV-B
(c) HIV-C (d) None of the above

407. HIV sentinel surveillance is used to identify/ calculate: *[AIIMS PGMEE November 2012]*
(a) High risk population
(b) Prevalence of HIV
(c) Trend finding among populations
(d) All of the above

408. Antiretroviral prophylaxis decrease the chance of transmission of HIV to fetus during pregnancy of HIV to fetus during pregnancy by *[Bihar 2014]*
(a) 35%
(b) 45%
(c) 50%
(d) 65%

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409. HIV virus was discovered in the year *[AIIMS May 2014]*
(a) 1981
(b) 1983
(c) 1986
(d) 1996

410. Most effective to prevent HIV Vertical transmission *[Recent Question 2015]*
(a) HAART
(b) Nevirapine
(c) Zidovudine
(d) Elective CS

411. Which vaccine for HIV is undergoing Phase 3 trial? *[Recent Question 2015]*
(a) mVA
(b) AIDS VAX
(c) CTL strain
(d) None of the above

412. Post-exposure prophylaxis against HIV infection should not be delayed beyond *[UPSC CMS 2015]*
(a) 4 hours
(b) 8 hours
(c) 24 hours
(d) 48 hours

413. Which states are qualified as high prevalence states in the context of HIV/AIDS? *[UPSC CMS 2015]*
(a) When prevalence in high risk groups is more than 5%, and less than 1% in antenatal women
(b) When prevalence in high risk groups is more than 5%, and 1% or more in antenatal women
(c) When prevalence in high risk groups is less than 5%, and more than 1% in antenatal women
(d) None of these

Review Questions

414. In a HIV infected child which vaccine should not be given: *[Kolkata 2004]*
(a) DPT (b) OPV
(c) Hepatitis B (d) Typhoid vaccine

415. About epidemiology of AIDS all are true *except*:
(a) In India it is mainly caused by HIV-1 *[MP 2002]*
(b) Maternofetal transmission is the most common mode of transmission
(c) I.V. drug abuse increases the risk
(d) Medical personnel are at higher risk of getting infection with HIV

416. First case of AIDS was reported in: *[MP 2003]*
(a) 1984 (b) 1986
(c) 1981 (d) 1988

417. All the following statements art true for the viral genome in HIV, *except*: *[MP 2009]*
(a) They are diploid
(b) They consist of DNA dependent DNA polymerase activity
(c) They consist of three major genes-gag, pol and env-characteristic of all retroviruses
(d) They are most complex of human retroviruses

418. From epidemiological point of view of AIDS, which of the following states in India is put in Group I (i.e. general epidemiological cases of HIV > 5% high risk and HIV > 1% ANC)? *[MH 2003]*
(a) Assam
(b) Mizoram
(c) Nagaland
(d) Tripura

419. Detailed plan titled "3 by 5" implemented by WHO in 2003 for AIDS means: *[MH 2007)*
(a) Treating at least 3 to 5 AIDS infections
(b) Controlling 3 chances of infection out of known 5
(c) Providing treatment to 3 million sufferers by year 2005
(d) All of the above

420. Window period for HIV infection is: *[RJ 2005]*
(a) 3-12 weeks
(b) 8-20 weeks
(c) 6-24 weeks
(d) None

421. Most common mode of HIV transmission from mother to child: *[RJ 2005]*
(a) 1st trimester
(b) 2nd transmission
(c) Perinatal
(d) Breastfeeding

STIS (OTHER THAN HIV)

422. Lymphogranuloma venereum is caused by:
(a) Haemophilus ducreyi *[AIIMS Dec 1997]*
(b) Calymmotabacterium granulomatis
(c) Treponema pertenue
(d) Chlamydia trachomatis

423. All the following are causative agents of sexually transmitted infections *except*:
(a) Candida *[AIPGME 1991]*
(b) Group B streptococcus
(c) Hepatitis B
(d) Echinococcus

424. Which of the following is not a STD agent?
(a) Ureaplasma urealyticum *[AIPGME 1991]*
(b) Gp. B Streptococcus
(c) Candida albicans
(d) Chlamydia psittaci

425. Match the treponemal disease and their causative agents: *[AIPGME 1993]*

A-Pinta	I-T. pertenue
B- Endemic Syphilis	II-T. carateum
C-Yaws	III-T. pallidum

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(a) A-I, B-II, C-III`
(b) A-II, B-I, C-III
(c) A-II, B-III, C-I
(d) A-I, B-III, C-II

426. The syndromic management of urethral discharge includes treatment of *[AIIMS Dec 1992]*
(a) Neisseria gonorrhoeae and herpes genitalis
(b) Chalamydia trachomatis and herpes genitalis
(c) Neisseria gonorrhoeae and Chlamydia trachomatis
(d) Syphilis and chancroid

427. In India, syndromic approach is used for management of: *[AIIMS November 2011]*
(a) Chancroid and Chancre
(b) Chancroid and Herpes genitalis
(c) Chancroid, Chancre and Herpes genitalis
(d) Chancre and Herpes genitalis

428. True about incubation periods of STDs:
(a) Syphilis 10-90 days *[PGI May 2011]*
(b) LGV 3-10 days
(c) Donovanosis 3-20 days
(d) Chancroid 21-28 days
(e) Gonorrhea 2-14 days

429. A sexually active, long distance truck driver's wife comes with vaginal discharge. Under Syndromic approach, which drug should be given? *[AIIMS PGMEE May 2012]*
(a) Metronidazole, Azithromycin, Fluconazole
(b) Metronidazole
(c) Azithromycin
(d) Metronidazole and fluconazole

430. Case detection in STDs is done by all except: *[NUPGET 2013]*
(a) Screening (b) Contact tracing
(c) Cluster testing (d) Notification

431. Drug of choice for Scabies in Pregnancy is
(a) Ivermectin *[Recent Question 2014]*
(b) Crotaminton
(c) Benzyl benzoate
(d) Permethrin

Review Questions

432. Cluster testing is useful in detecting cases of:
(a) STD *[DNB 2005, RJ 2007, DNB 2006]*
(b) Cancer *[AIPGME 2002, DNB 2000]*
(c) Diabetes
(d) Measles

433. Scabies is caused by: *[Bihar 2005]*
(a) Trichophyton (b) Dermatophyten
(c) Mycobacterium (d) Sarcoptes scabei

434. Incubation period of chancroid is:
(a) Less than 7 days *[Kolkata 2005]*
(b) 10-15 days
(c) 2-3 weeks
(d) 3-4 weeks

435. Incubation period of syphilis: *[MH 2002]*
(a) 9-90 days (b) 9-18 days
(c) 80-90 days (d) 10 days

436. Method of case detection in control of sexually transmitted diseases in which person names the persons moving in same socio-sexual environment?
(a) Contact tracing *[MH 2007]*
(b) High risk screening
(c) Selective screening
(d) Cluster testing

OTHER COMMUNICABLE DISEASES

437. All of the following are zoonoses *except*:
(a) Plague *[AIPGME 1995 and 08]*
(b) Japanese emcephalitis
(c) HIV
(d) Tuberculosis

438. Which of the following statements about Yaws is not true? *[AIPGME 2008]*
(a) Spread by sexual transmission
(b) Caused by Treponema pertenue
(c) Has cross immunity with Syphilis
(d) Cannot be differentiated serologically from Treponema pallidum

439. Dhamendra's Index and Jopling's classification deals with: *[AIPGME 2008]*
(a) TB
(b) Leprosy
(c) Syphilis
(d) Polio

440. The following are characteristic features of staphylococcal food poisoning, *except*: *[AIIMS May 2004]*
(a) Optimum temperature for toxin formation is 37°C
(b) Intra-dietetic toxins are responsible for intestinal symptoms
(c) Toxins can be destroyed by boiling for 30 minutes
(d) Incubation period is 1-6 hours

441. Iceberg phenomenon is not seen in:
(a) AIDS *[AIIMS Nov 1993]*
(b) TB
(c) Poliomyelitis
(d) Measles

442. All of the following diseases can be transmitted during the incubation period *except*: *[AIIMS June 1997]*
(a) Measles
(b) Tuberculosis
(c) Hepatitis A
(d) Pertussis

443. In all of the following diseases chronic carriers are found *except*: *[AIIMS Sep 96, May-2006]*
[AIIMS June 1998]
(a) Measles
(b) Typhoid
(c) Hepatitis B
(d) Gonorrhea

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444. Brucellosis can be transmitted by all of the following modes, *except*: *[AIIMS May 2006-2007, Nov 2006]*
(a) Contact with infected placenta
(b) Ingestion of raw vegetables from infected farms
(c) Person to person transmission
(d) Inhalation of infected dust or aerosol

445. Which one of the following arboviral diseases has not been reported in India?
(a) Japanese encephalitis
(b) Yellow fever *[AIIMS Nov 2004, AIPGME 1997]*
(c) Chikungunya fever *[Recent Question 2012]*
(d) Kyasanur forest disease

446. In which of these conditions is post exposure prophylaxis NOT useful? *[AIIMS May 2001, Nov 2004]*
(a) Measles
(b) Rabies
(c) Pertussis
(d) Hepatitis B

447. "Hundred day cough" is the name of: *[AIIMS Feb 1997]*
(a) Cough due to Bordetella pertussis
(b) Cough due to haemophylus influenza
(c) Cough due to adenovirus
(d) Cough due to respiratory syncytial virus

448. Which one of the following diseases CANNOT be eradicated: *[AIPGME 1992 , 2003]*
(a) Leprosy
(b) Tuberculosis
(c) Measles
(d) Pertussis

449. '3 by 5 Initiative' was launched in developing countries to combat: *[AIIMS May 2005]*
(a) Tuberculosis
(b) Malaria
(c) SARS
(d) HIV/AIDS

450. Intermediate host for Taenia saginata is:
(a) Man *[AIIMS May 1994]*
(b) Cattle
(c) Pig
(d) Fish

451. A synthetic "cocktail" vaccine SPf66 has shown potential for the protection against: *[AIIMS June 1997]*
(a) Dengue/DHF
(b) Japanese encephalitis
(c) Falciparum Malaria
(d) Lymphatic filariasis

452. All of the following are blood-borne infections except:
(a) Hepatitis B *[AIIMS Nov 2003]*
(b) Hepatitis C
(c) Hepatitis E
(d) Hepatitis G

453. WHO vaccination strategy of catch-up, keep-up and follow-up has been designed for:
(a) Measles *[AIIMS May 2003]*
(b) Chickenpox
(c) Polio
(d) Diphtheria

454. Carriers are important in all the following *except*:
(a) Polio *[AIPGME 2002, AIPGME 2007]*
(b) Typhoid *[AIIMS Dec 98]*
(c) Measles
(d) Diphtheria

455. Chandler's index is based on: *[DPG 2004]*
(a) Hookworm eggs in soil
(b) Hookworm eggs per gram faeces
(c) Giardia cysts in soil
(d) Ascaris larva in water

456. Man in the only host for: *[DPG 2006]*
(a) Trichuris trichura
(b) Dracunculus medinensis
(c) Onchocerca volvolus
(d) Wuchereria bancrofti

457. Which of the following is not administered by intradermal route? *[DPG 2007, 2008]*
(a) BCG
(b) Insulin
(c) Mantoux
(d) Drug sensitivity injection

458. Disease caused by arboviruses *include*:
(a) Yellow fever *[PGI June 02]*
(b) Japanese encephalitis
(c) Trench fever
(d) Epidemic typhus
(e) Dengue

459. Cluster testing is the term used during:
(a) UIP Survey for polio *[Karnataka 2007]*
(b) Screening for STD's
(c) Exposing the body for hypopigmented patches
(d) Testing contacts of typhoid cases

460. Incubation period less than few hours:
(a) Hepatitis – A *[PGI Dec 2K]*
(b) Food poisoning
(c) Influenza
(d) Rabies

461. Arboviral disease are: *[PGI Dec 2K]*
(a) Yellow fever
(b) Epidemic typhus
(c) Japanese encephalitis
(d) Kalaazar
(e) HIV

462. Zoonosis is/are: *[PGI June 08]*
(a) Anthrax
(b) Brucellosis
(c) Leptospirosis
(d) Caga's disease
(e) Tularaemia

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463. Post exposure prophylaxis in health care professional is indicated in infections with: *[PGI Dec 08]*
(a) HBV (b) Rabies
(c) Diphtheria (d) Measles
(e) Tetanus

464. Epidemic caused by type A arbovirus in India is:
(a) Chikungunya *[DPG 2008]*
(b) KFD
(c) Yellow Fever
(d) Dengue

465. Karatomalacia is seen in which of the following diseases: *[PGI June 02]*
(a) Measles *[PGI 2001]*
(b) Diarrhea
(c) Mumps
(d) Rubella
(e) Chickenpox

466. Pandemics are caused by: *[PGI June 05]*
(a) Hepatitis-B
(b) Influenza-A
(c) Influenza-B
(d) Influenza-C

467. Animal to man transmission seen in:
(a) Rabies *[PGI Dec 08]*
(b) Japanese encephalitis
(c) HIV
(d) Mumps
(e) Tetanus

468. Vector borne diseases are: *[PGI Dec 08]*
(a) Epidemic typhus
(b) Japanese encephalitis
(c) Tetanus
(d) Hanta virus disease
(e) KFD

469. Viruses documented to cause fetal damage:
(a) Hepatitis B *[PGI June 05]*
(b) Varicella
(c) Measles
(d) Parvovirus

470. Which of the following is not transmitted by lice?
(a) Trench fever *[AIIMS May 2009]*
(b) Relapsing fever
(c) Q fever
(d) Epidemic typhus

471. False about Japanese Encephalitis is: *[AIIMS Nov 2009]*
(a) Pigs are amplifiers for flavirirus
(b) Overhead tanks severe as breeding sites
(c) Transmitted by culex mosquitoes
(d) Primary doses of vaccine consists of two doses

472. Mass prophylaxis is given for all *except*:
(a) Lymphatic filariasis *[AIIMS Nov 2010]*
(b) Vitamin A deficiency
(c) Scabies
(d) Worm infestation

473. Modes of transmission of amoebiasis are all *except*:
(a) Faecal-oral *[AIIMS Nov 2010]*
(b) Oro-rectal
(c) Vertical transmission
(d) Through cockroaches

474. Arthropod borne disease not seen in India is:
(a) West Nile Fever *[AIPGME 2011]*
(b) Dengue infection
(c) Kyasanur Forest Disease
(d) Yellow Fever

475. Carrier state is not important in transmission of:
(a) Typhoid *[DNB 2003, AIPGME 2011]*
(b) Poliomyelitis
(c) Measles
(d) Diphtheria

476. All are true about Yaws *except*: *[AIPGME 2011]*
(a) Caused by Treponema pertenue
(b) Transmitted non-venerally
(c) Secondary Yaws can involve bones
(d) Later stages involve heart and nerves

477. Tetracycline is used in the prophylaxis of:
(a) Cholera *[AIPGME 2011]*
(b) Brucellosis
(c) Leptospirosis
(d) Meningitis

478. Maternal antibodies do not occur for: *[DPG 2011]*
(a) Polio
(b) Diphtheria
(c) Whooping cough
(d) Tetanus

479. Brucellosis is transmitted by: *[PGI May 2011]*
(a) Cattle
(b) Camel
(c) Sheep
(d) Goat
(e) Dogs

480. Arboviral infection(s) include: *[PGI May 2012]*
(a) Chikungunya fever
(b) West Nile fever
(c) JE
(d) Sandfly fever
(e) Malaria

481. Which is not transmitted by Aedes aegypti?
(a) Yellow fever *[DNB June 2011]*
(b) Dengue
(c) Japanese encephalitis
(d) Filariasis

482. Maternal antibodies are present in the newborn against all of the following disease *except*: *[DNB 2008]*
(a) Diphtheria
(b) Tetanus
(c) Pertussis
(d) Measles

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483. Mass prophylaxis not done in: *[AIIMS PGMEE November 2012]*
(a) Scabies
(b) Lymphatic filariasis
(c) Vitamin A deficiency
(d) Worm infestation

484. Rat is associated with: *[DNB June 2010]* *[Recent Questions 2014]*
(a) Leptospirosis
(b) Measles
(c) Tetanus
(d) Influenza

485. Incubation period of which disease is less than 7 days:
(a) Cholera *[Recent Question 2012]*
(b) Measles
(c) Leishmaniasis
(d) Mumps

486. Dome shaped centrally umbilicated papules seen in:
(a) Chickenpox *[DNB December 2011]*
(b) Smallpox
(c) Measles
(d) Molluscum contagiosum

487. Which of the following is a zoonotic disease? *[Recent Question 2012]* *[Recent Question 2013]*
(a) Hydatid cyst
(b) Malaria
(c) Filariasis
(d) Dengue fever

488. Subclinical infection is seen in all *except*:
(a) Mumps *[Recent Question 2012]*
(b) Poliomyelitis
(c) Measles
(d) Rubella

489. Zoonotic disease(s) transmitted by arthropods is/ are:
(a) Plague *[PGI May 2012]*
(b) Melidioses
(c) Rabies
(d) Leishmaniasis
(e) Anthrax

490. Second attack rate is minimum in:
(a) TB *[Recent Question 2013]*
(b) Diphtheria
(c) Measles
(d) Whooping cough

491. Post-exposure prophylaxis exist for all *except*:
(a) Measles *[NUPGET 2013]*
(b) Hepatitis C
(c) Varicella Zoster
(d) HIV

492. Scabies treatment(s) include: *[PGI May 2012]*
(a) Gammexene
(b) Crotamiton
(c) 5% Permethrin
(d) Isoniazid
(e) Sulphur ointment

493. Zoonotic disease of viral etiology include:
(a) Q fever *[NUPGET 2013]*
(b) Rickettsiae disease
(c) Rabies
(d) Rubella

494. Prophylaxis for anthrax: *[Recent Question 2013]*
(a) Erythromycin
(b) Doxycycline
(c) Penicillin
(d) Vancomycin

495. Isolation period, false is: *[AIIMS May 2013]*
(a) Chickenpox – 6 days after onset of rash
(b) Herpes zoster – 6 days after onset of rash
(c) Measles – up to 3 days after onset of rash
(d) German measles – 7 days after onset of rash

496. Lyme disease is transmitted by: *[Recent Question 2012]*
(a) Rat flea
(b) Tick
(c) Mite
(d) Mosquito

497. True about Leptospirosis is/are: *[PGI November 2012]*
(a) It is a Zoonosis
(b) Incubation period is 2-3 months
(c) Transmission occurs through direct skin contact
(d) Drug of choice is Penicillin
(e) Is a Spirochaetal disease

498. Following are examples of human "dead end" disease *except*: *[Recent Question 2013]*
(a) Bubonic plague
(b) Japanese encephalitis
(c) Hydatid disease
(d) Leishmaniasis

499. Chemoprophylaxis is not required in is:
(a) Typhoid *[Recent Question 2013]*
(b) Meningococcal meningitis
(c) Bacterial conjunctivitis
(d) Malaria

500. Which disease does not occur as seasonal variation?
(a) Measles *[Recent Question 2012]*
(b) Rubella
(c) Gastroenteritis
(d) Cerebra meningitis

501. The following fall under the category of enzootic *except*: *[DNB 2007]*
(a) Influenza
(b) Anthrax
(c) Brucellosis
(d) Endemic typhus

502. Tick borne relapsing fever is caused by?
(a) Borrelia recurrentis *[DNB December 2010]*
(b) Borrelia burgdorferi
(c) Rickettsia prowazeki
(d) Borellia hermsii

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503. Viral hemorrhagic fever(s) seen in India is/ are: *[PGI November 2013]*
(a) KFD
(b) Dengue fever
(c) Crimean Congo fever
(d) Yellow fever
(e) Hanta fever

504. Saddleback fever is known as *[NIMHANS 2014]*
(a) Brucellosis
(b) Dengue fever
(c) Malaria fever
(d) Typhoid fever

505. Chemoprophylaxis is not required in *[AIIMS May 2014]*
(a) Conjunctivitis
(b) Meningitis
(c) Measles
(d) Plague

506. Following is NOT caused by virus
(a) Rocky mountain spotted fever
(b) KFD *[Recent Question 2014]*
(c) Dengue
(d) Yellow fever

507. Transplacental transmission is not seen in
(a) Hepatitis A *[Recent Question 2014]*
(b) Hepatitis B
(c) HIV
(d) Varicella

508. Regarding Non-industrial anthrax, true is/are
(a) Common in veterinarians
(b) Seasonal pattern *[PGI November 2014]*
(c) Common in butchers
(d) Cutaneous form most common
(e) More commonly inhalational than industrial form

509. Not true about Ebola virus is *[PGI November 2014]*
(a) Caused by ss Negative strand RNA virus
(b) Bats most likely reservoir
(c) Incubation period is less than 48 hours
(d) Sexual transmission possible
(e) Oseltamivir is quite effective in treatment

510. Zoonoses include *[PGI November 2014]*
(a) Plague
(b) Rabies
(c) Anthrax
(d) Tetanus
(e) Brucellosis

511. Incubation period less than 5 days is
(a) Influenza *[PGI November 2014]*
(b) Salmonella typhi
(c) Vibrio parahemolyticus
(d) Yersinia
(e) Swine flu

512. Metazoonoses include *[JIPMER 2014]*
(a) Plague
(b) Rabies
(c) Schistosomiasis
(d) Brucellosis
(e) Yellow fever

513. MC Shigella subtype in India is *[Recent Question 2015]*
(a) Shigella dysenteriae
(b) Shigella flexneri
(c) Shigella boydii
(d) Shigella sonnei

514. Mode of spread of Ebola virus *[Recent Question 2015]*
(a) Aerogenous
(b) Body fluids
(c) Water-borne
(d) Insect bite

515. Consider the following diseases
1. Measles
2. Polio
3. Staphylococcal food poisoning
4. Typhoid

Which of the above are the correct examples for incubation period of 10-14 days? *[UPSC CMS 2015]*
(a) 1 and 3
(b) 2 and 4
(c) 1 and 4
(d) 3 and 4

Review Questions

516. Staphylococcus food poisoning causes all *except*:
(a) Due to enterotoxin *[DNB 2001]*
(b) IP below 6 hours
(c) Sudden onset
(d) Fever common

517. Inclusion body in neuron is seen in:
(a) Rabies *[DNB 2001]*
(b) Diphtheria
(c) Yellow fever
(d) Japanese encephalitis

518. Man is dead end for: *[DNB 2003]*
(a) Tetanus, measles
(b) Measles, yellow fever
(c) Tetanus, yellow fever
(d) Rabies, tetanus

519. Agent can be used in bioterrorism: *[Bihar 2005]*
(a) Plague
(b) Typhoid
(c) Streptococcus
(d) Staph. aureus

520. Incubation period is less than one week in:
(a) Cholera *[UP 2003]*
(b) Enteric fever
(c) Hepatitis B
(d) Chickenpox

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521. Sub acute-Sclerosing pan – encephalitis (SSP(E) is caused by: *[UP 2005]*
(a) Measles
(b) Mumps
(c) Rubella
(d) Smallpox

522. Clinical features of Botulism are all Except:
(a) Diarrhea *[UP 2006]*
(b) Dysarthria
(c) Ocular nerve paralysis
(d) Blurring of vision

523. Pleomorphism is seen in: *[UP 2006]*
(a) Chickenpox
(b) Rubella
(c) Smallpox
(d) Toxocara

524. Amphixenosis is: *[UP 2007]*
(a) Ascaris lumbricoidis
(b) Entrobius - vermicularis
(c) Anthrax
(d) T. cruzi

525. Following are examples of human "dead end" disease *except*: *[UP 2007]*
(a) Bubonic plague
(b) Japanese encephalitis
(c) Hydatid disease
(d) Leishmaniasis

526. All are zoonotic disease *except*: *[UP 2008]*
(a) Brucellosis
(b) Leptospirosis
(c) Scabies
(d) Rabies

527. Shortest Incubation period is associated with:
(a) Influenza *[AP 2002]*
(b) Cholera
(c) Syphilis
(d) AIDS

528. Disease transmitted by water is: *[AP 2003]*
(a) Hepatitis B
(b) Polio
(c) Japanese encephalitis
(d) Dengue fever

529. Which of the following flavi virus is closely related to Russian spring summer encephalitis causing virus:
(a) Dengue *[AP 2004]*
(b) Chikungunya
(c) KFD
(d) Yellow fever

530. Which statement is not true in arboviral disease?
(a) Japanese encephalitis is transmitted by culex
(b) KFD is transmitted by Ticks *[AP 2005]*
(c) Filariasis is transmitted by Aedes mosquito
(d) Dengue is transmitted by Aedes mosquito

531. All of the following are Anthropozoonotic Diseases *except*: *[AP 2008]*
(a) Plague
(b) Rabies
(c) Hydatid cyst
(d) Dracunculosis

532. Leptospira icterohaemorrhagiae infection is transmitted by the following animals: *[AP 1987]*
(a) Rats *[NIMHANS 2001] [TN 1995] [TN 2000]*
(b) Dogs
(c) Birds
(d) Bats

533. Patients are to be isolated in all of the following diseases except: *[TN 2003]*
(a) AIDS (b) Smallpox
(c) Anthrax (d) Plague

534. Cyclops is an intermediate host for: *[TN 2005]*
(a) Guinea worm
(b) Malaria
(c) Rabies
(d) Salmonella

535. Tick-borne disease is: *[Kolkata 2004]*
(a) Tularemia
(b) Q fever
(c) Relapsing fever
(d) Rocky mountain spotted fever

536. Aedes transmit which of the following disease in India: *[Kolkata 2004]*
(a) Dengue
(b) Chikungunya fever
(c) Malaria/Filaria
(d) Japanese encephalitis

537. Cyclopropogative cycle is seen is *[Kolkata 2009]*
(a) Malaria *[Recent Question 2012]*
(b) Filaria
(c) Yellow fever
(d) Plague

538. Food poisoning is caused by all *except*: *[MP 2000]*
(a) Staphylococcus aureus
(b) Clostridium difficile
(c) Vibrio parahaemolyticus
(d) Bacillus cereus

539. Incubation period in staphylococcal food poisoning:
(a) 1-6 hours *[MP 2001]*
(b) 6-12 hours
(c) 16-18 hours
(d) 24 hours

540. Isolation is not useful in: *[MP 2002]*
(a) Polio
(b) Cholera
(c) Measles
(d) Diphtheria

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541. Which of the following is most prevalent presently in India: *[MP 2002]*
(a) Polio
(b) Dracunculiasis
(c) Plague
(d) Kala-azar

542. Man is a dead end host in all of the following infections *except*: *[MP 2002]*
(a) Teniasis
(b) Rabies
(c) Japanese encephalitis
(d) Tetanus

543. Iceberg phenomena is seen in all *except*:
(a) Leprosy *[MP 2003]*
(b) Rabies
(c) Hypertension
(d) Tuberculosis

544. Antigenic shift and drift occurs in: *[MP 2005]*
(a) Measles
(b) Mumps
(c) Influenza
(d) Rubella

545. Yaws is a disease caused by: *[MP 2007]*
(a) Treponema Pertenue
(b) Treponema Pallidum
(c) Treponema Carateum
(d) Trypanosoma Cruzi

546. Due to epidemiological reasons chemoprophylaxis is most impractical in the control of: *[MH 2003]*
(a) Measles
(b) Cholera
(c) Diphtheria
(d) Tuberculosis

547. Plague is what type of zoonosis? *[MH 2005]*
(a) Cyclozoonosis *[JIPMER 2014]*
(b) Direct zoonosis
(c) Sapro-zoonosis
(d) Meta zoonosis

548. Which is not a zoonotic disease? *[RJ 2002]*
(a) Brucellosis
(b) Malaria
(c) Rabies
(d) Trichinoses

549. Which is not a zoonotic disease? *[RJ 2003]*
(a) Tetanus
(b) Rabies
(c) Brucellosis
(d) Hydatid disease

550. Shortest incubation period is of: *[RJ 2004]*
(a) Diphtheria
(b) Rubella
(c) Smallpox
(d) Chickenpox

551. Which one of the following is an Index of communicability of an Infection? *[RJ 2009]*
(a) Carrier rate
(b) Prevalence rate
(c) Secondary attack rate
(d) Primary attack rate

EMERGING AND RE-EMERGING INFECTIONS

552. False about SARS is *[Recent Question 2015]*
(a) Incubation period is 3-5 days
(b) Effective vaccine with 82% protective efficacy
(c) Ribavirin is used for treatment
(d) Mortality rate is around 14%

CORONARY HEART DISEASE

553. Following dietary changes are advised to reduce prevalence of coronary heart disease *except*: *[AIPGME 1997, 04]*
(a) Increased complex carbohydrate intake
(b) Saturated fat intake less than 10% of total energy intake
(c) Salt intake less than 20g/day
(d) Reduce fat intake to 20-30% of total energy intake

554. Which one of the following statements about influence of smoking on risk of coronary heart disease (CHD) is not true? *[AIPGME 2005] [AIPGME 1999]*
(a) Risk of death from CHD decreases from cessation of smoking *[AIPGME 1999]*
(b) Filters provide a protective effect for CHD
(c) Influence of smoking is synergistic to other risk factors for CHD
(d) Influence of smoking is directly related to number of cigarettes smoked per day

555. Which of the following is maximally associated with Coronary heart disease? *[AIIMS Nov 2010]*
(a) HDL (b) VLDL
(c) LDL (d) Chylomicrons

556. Which of the following is not a dietary modification recommended in high risk cardiovascular group?
(a) LDL cholesterol less than 100 mg/dL
(b) Avoid alcohol *[AIPGME 2011]*
(c) Saturated fat intake 7% of total calories
(d) Salt intake less than 5 grams

557. Inability to perform any work without discomfort is
(a) NYHA 1 *[AIIMS November 2014]*
(b) NYHA 2
(c) NYHA 3
(d) NYHA 4

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558. Clinical goal of "cholesterol/HDL ratio" recommended for CHD prevention is *[PGMCET 2015]*
(a) < 3.5
(b) < 2.5
(c) < 10.5
(d) < 1.5

Review Questions

559. All are true for coronary heart disease in India compared to west *except*: *[DNB 2001]*
(a) Increasing
(b) Decreasing
(c) Common in younger age
(d) None

560. False about coronary heart disease: *[AP 2007]*
(a) Indian CHD occurs 1 decade later than Western CHD
(b) Heavy cigarette smoking is a risk factor
(c) Males are affected more than females
(d) None

561. All of the following are true about coronary heart diseases in India *except*: *[MP 2000]*
(a) Smoking predisposition seen
(b) Mean age of patient is 10-20 years more than that of western
(c) Seen more in males
(d) DM predisposition to MI is seen

562. Best-know large sample study programme for coronary heart disease is: *[MH 2003]* *[Recent Question 2013]*
(a) Framingham study
(b) North kerelia study
(c) Standford study
(d) Oxford study

563. Modifiable risk factors in coronary artery disease are all *except*: *[MH 2005]*
(a) Personality (b) Smoking
(c) Obesity (d) Hypertension

HYPERTENSION

564. True about hypertension, the primary prevention includes: *[PGI June 06]*
(a) Weight reduction
(b) Exercise promotion
(c) Reduction of salt intake
(d) Early diagnosis of hypertension
(e) Self care

565. Modifiable risk factors for hypertension is? *[Recent Question 2013]*
(a) Ethinicity
(b) Age
(c) Sex
(d) Obesity

566. Tracking of BP implies *[Recent Question 2014]*
(a) BP increase with age
(b) BP decreases with age
(c) BP of hyoptensive become hypertensive
(d) BP of hyoptensive remain hypotensive

567. What is DASH? *[PGMCET 2015]*
(a) Dietary approaches to stop hypertension
(b) Domestic approach to safeguard hepatitis
(c) Dietary approaches to stop hyperlipidemia
(d) Domestic approaches to stop hypertension

568. Diet to be prescribed in hypertension *[Recent Question 2015]*
(a) Fruits, vegetables and low salt diet
(b) Proteins, fibres and low salt diet
(c) Carbohydrate, fibres and low salt diet
(d) Fruits, vegetables, Low fat dairy foods

RHEUMATIC FEVER

569. All of the following statements about rheumatic fever/heart disease epidemiology in India are true *except*: *[AIIMS Nov 2002]*
(a) Its prevalence varies between 2 to 11 per 1000 children aged 5-16 years
(b) Mitral regurgitation is the commonest cardiac lesion seen
(c) It occurs equally in females and males
(d) Rheumatic fever occurs in about 2% of streptococcal sore throats

570. All are true about Rheumatic Fever in India *except*: *[AIIMS Dec 1994]*
(a) RF is reported in 1-3 % of streptococcal infections
(b) More commonly seen in 5-15 years age group
(c) Except carditis, other manifestations do not cause permanent damage
(d) In Revised Jones' Criteria, evidence of preceding streptococcal infection is taken for last 21 days

571. All of the following are Major criteria of Jones in Rheumatic fever *except*: *[AIIMS Nov 2010]*
(a) Pancarditis
(b) Arthritis
(c) Chorea
(d) Elevated ESR

572. Not included among major criteria in acute rheumatic fever is: *[AIIMS PGMEE May 2013]*
(a) Erythema marginatum
(b) Polyarthralgia
(c) Chorea
(d) Pancarditis

573. Rheumatic Heart Disease can be prevented by *[UPSC CMS 2015]*
(a) Screening of school going children
(b) Vaccination against Streptococcus
(c) Treatment of respiratory infections in children
(d) All of these

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CANCERS

574. The most common cancer affecting Indian urban women in Delhi, Mumbai and Chennai is: *[DNB 2007, AIPGME 2005]*
(a) Cervical cancer
(b) Ovarian cancer
(c) Breast cancer
(d) Uterine cancer

575. The most common cancer, affecting both males and females of the world, is: *[AIIMS May 2005, Dec 1994]*
(a) Cancer of the pancreas *[Recent Question 2013]*
(b) Buccal mucosa cancer
(c) Lung cancer
(d) Colorectal cancer

576. The most common malignant tumor of adult males in India is: *[AIPGME 2004]*
(a) Oropharyngeal carcinoma
(b) Gastric carcinoma
(c) Colorectal carcinoma
(d) Lung cancer

577. The most common type of cancer among females in India is: *[Karnataka 2005]*
(a) Cervical cancer
(b) Breast cancer
(c) Ovarian cancer
(d) Colonic cancer

578. Habits and customs are conducive to cancer as evident below *except*: *[Karnataka 2006]*
(a) Kangri cancer in Kashmir due to hot pot in winter
(b) Oral cancer due to pan chewing in India
(c) Penile cancer and cervical cancer following circumcision
(d) Lung cancer due to smoking

579. HPV Vaccination True A/E: *[PGI June 02]*
(a) Protects from Ca Cx in >70% cases
(b) 2 primary doses req for immunization
(c) Protects against HSV 16 and 18
(d) Mixed vaccine, needs refrigeration
(e) Recommended for age group 20-40 yrs

580. Which of the following can be prevented by screening: *[PGI June 08]*
(a) Ca cervix
(b) Ca Breast
(c) Ca Prostate
(d) Ca Lung
(e) Ca Colon

581. Highest increase in survival rate is seen after screening of: *[AIIMS May 2011]*
(a) Carcinoma cervix
(b) Carcinoma lungs
(c) Carcinoma colon
(d) Carcinoma breast

582. Current cancer patients in India reported annually: *[AIIMS PGMEE November 2012]*
(a) 0.5 million
(b) 1 million
(c) 5 millions
(d) 10 millions

583. Globally most common cancer is: *[NUPGET 2013]*
(a) Colorectal cancer
(b) Bladder cancer
(c) Lung cancer
(d) Oropharyngeal cancer

584. The most common cancer, affecting Indian urban women in Delhi, Mumbai and Chennai is: *[DNB 2007]*
(a) Cervical cancer
(b) Ovarian cancer
(c) Breast cancer
(d) Uterine cancer

585. Tobacco responsible for oral cancer is
(a) 100% *[Recent Question 2014]*
(b) 40%
(c) 90%
(d) 60%

586. Maximum mortality in India among women is due to which carcinoma? *[Recent Question 2015]*
(a) Lungs
(b) Cervix-uteri
(c) Ovary
(d) Breast

587. Which of the following is the MC malignant tumor in Adult males in India? *[UPSC CMS 2015]*
(a) Lung cancer
(b) Oropharyngeal carcinoma
(c) Gastric carcinoma
(d) Colorectal carcinoma

588. Early warning signs of Cancer that Public should be aware include all *except*: *[Recent Question 2015]*
(a) Persistent cough
(b) Lump or hard area in breast
(c) Unexplained weight gain
(d) Change in wart/mole

Review Questions

589. Best method of screening for early detection of carcinoma breast in young woman is: *[Bihar 2004]*
(a) Regular X-rays
(b) Self examination
(c) Mammography
(d) Regular biopsies

590. "Field carcinogenesis" is seen in: *[UP 2000]*
(a) Head and neck carcinoma
(b) Colon carcinoma
(c) Brain tumor
(d) Breast carcinoma

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591. Risk factors for Cancer cervix are increased by the following: *[MP 2007]*
(a) Less than 20 years of age
(b) Late marriage
(c) Upper socio-economic class
(d) Early marriage

592. Which is not a predisposing factor for carcinoma cervix? *[RJ 2001]*
(a) Early marriage
(b) Early coitus
(c) Early child bearing
(d) Single child birth

OBESITY

593. For Asian populations, the normal BMI (Body Mass Index) range is: *[DNB 2010, AIIMS Nov 2008]*
(a) 18.5 – 24.99
(b) 18.5 – 22.99
(c) 20.5 – 24.99
(d) 20.5 – 22.99

594. What will be the BMI of a male whose weight is 89 kg and height is 172 cm? *[AIPGME 2005]*
(a) 27 (b) 30
(c) 33 (d) 36

595. All of the following sites are used for measuring skin fold thickness to assess obesity *except*: *[AIPGME 2004]*
(a) Mid-triceps
(b) Biceps
(c) Subscapular
(d) Anterior abdominal wall

596. Which of the following indices of obesity is height-independent? *[AIPGME 1991]*
(a) Quetelet's Index
(b) Ponderal Index
(c) Broca's Index
(d) Corpulence Index

597. A patient is called obese if BMI is: *[AIPGME 2007]* *[Recent Question 2013]*
(a) 20-30
(b) > 25
(c) > 30
(d) > 40

598. Internationally accepted method of measuring obesity is: *[DPG 2006]*
(a) BMI
(b) Ponderal index
(c) Lorentz index
(d) Corpulence index

599. Which of the following should be done to reduce obesity? *[DPG 2006]*
(a) Regular exercise with same amount of food
(b) Decrease fat intake but have stomach full
(c) Reduce the amount of fat in diet only
(d) Reduce intake of fats, carbohydrates and protein

600. An adult is considered to be overweight if he/she has the BMI: *[Karnataka 2009]*
(a) >18.5
(b) > 20
(c) > 25
(d) None of the above

601. Obesity indices are: *[PGI June 02]*
(a) Broca's index
(b) Ponderal index
(c) Quetelet index
(d) Corpulence index

602. Overweight BMI: *[Recent Question 2013]*
(a) 25-29.99
(b) 15-18.5
(c) 18.5-24.99
(d) 30-34.99

603. Calculate BMI if weight in kilograms is 98 and height in centimeters is 175: *[DNB December 2009] [DNB December 2011]*
(a) 28
(b) 32
(c) 36
(d) 40

604. What will be the BMI of a male whose weight is 89 kg and height is 172 cm: *[DNB 2007]*
(a) 27
(b) 30
(c) 33
(d) 36

605. Which index of obesity does not include height?
(a) BMI *[DNB June 2010]*
(b) Ponderal's index
(c) Broca's index
(d) Corpulence index

606. Normal range of BMI Asian individual is:
(a) 18.5 to 24.99 *[DNB December 2010]*
(b) 22.5 to 24.99
(c) 18.5 to 22.5
(d) 18.5 to 22.99

607. Height in centimetres by cube root of body weight is also known as: *[DNB December 2011]*
(a) Quetelet index
(b) Broca index
(c) Ponderal's index
(d) Corpulence index

608. Which index of obesity does not include height?
(a) BMI *[Recent Question 2013]*
(b) Ponderal's index
(c) Broca's index
(d) Corpulence index

609. Corpulence index means: *[DNB 2008]*
(a) Measurement of obesity
(b) Measurement of copper level in serum
(c) Measurement of iron losses in faeces
(d) Pressure difference b/w chambers of heart

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610. Which is the cutoff level of Waist-Hip Ratio in Women indicating abdominal fat accumulation? *[PGMCET 2015]*
(a) 0.75
(b) 0.85
(c) 0.95
(d) 1.05

Review Questions

611. What will be the BMI of a male whose weight is 89 kg and height is 172 cm: *[DNB 2007]*
[Recent Question 2013]
(a) 27
(b) 30
(c) 33
(d) 36

612. Corpulence index means: *[DNB 2008]*
(a) Measurement of obesity
(b) Measurement of copper level in serum
(c) Measurement of iron losses in faeces
(d) Pressure difference b/w chambers of heart

613. Assessment of obesity by following measurement *except*: *[UP 2006]*
(a) Quetelet's index
(b) Broca index
(c) Corpulence index
(d) Sullivan's index

614. Body mass index is also known as: *[UP 2007]*
(a) Broca's index
(b) Corpulence index
(c) Quetelet's index
(d) Lorentz's formula

615. Abdominal fat accumulation is assessed by:
(a) Corpulence index *[MP 2005]*
(b) Broca's index
(c) Ponderal index
(d) Waist to hip ratio

616. BMI (body mass index) is defined as: *[JIPMER 2000]*
[All India 2005, MH 2005, DPG 2006]
(a) $\frac{\text{Weight (kg)}}{(\text{Height})^2 \text{ (meters)}}$
(b) $\frac{\text{Weight (Kg)}}{(\text{Height})^{16} \text{ (cm)}}$
(c) $\frac{\text{Midarm circumference (cm)}}{\text{Head circumstance (cm)}}$
(d) Midarm circumference (cm) between ages of 1-5 years

BLINDNESS

617. Taking the definition of blindness as visual acuity less than 3/60 in the better eye, the number of blind persons per 100,000 population in India is estimated to be:
(a) 500 *[AIIMS Nov 2003]*
(b) 700
(c) 1000
(d) 1500

618. The most common cause of blindness in India is:
(a) Cataract *[CGPG 2015, DNB 2001, 04, AIIMS May 1995]*
(b) Trachoma *[AP 2001, MH 2000, AIIMS Nov 2005]*
(c) Refractive errors *[TN 2002, DPG 1991]*
(d) Vitamin A deficiency

619. Under NPCB in India, cutoff for blindness is defined as having a vision of: *[AIPGME 2000]*
(a) < 3/60 in worse eye *[PGMCET 2015]*
(b) < 6/60 in better eye
(c) < 3/60 in better eye
(d) < 6/60 in worse eye

620. Disease not included in Vision 2020, India is:
(a) Cataract *[AIPGME 2005]*
(b) Glaucoma *[Recent Question 2012]*
(c) Diabetic retinopathy
(d) Onchocerciasis

621. The commonest cause of low vision in India is:
(a) Uncorrected refractive errors *[AIPGME 2004]*
(b) Cataract *[AIPGME 2003]*
(c) Glaucoma
(d) Squint

622. According to the National Programme for Control of Blindness (NPC(B) survey (1986-89), the highest prevalence of blindness in India is in:
(a) Jammu and Kashmir *[AIIMS Dec 1991]*
(b) Orissa
(c) Bihar
(d) Uttar Pradesh

623. Blindness can be seen in: *[PGI Dec 2K]*
(a) Measles
(b) Mumps
(c) Rubella
(d) Coxsackie

624. If Blindness is surveyed using Schools as compared to Population Surveys, then estimation of prevalence of blindness will have? *[AIIMS PGMEE May 2013]*
(a) Overestimation
(b) Underestimation
(c) Remains same
(d) None of them is used for evaluation

625. Disability certificate is given for poor vision if visual acuity is 4/60, in tune of visual impairment as a percentage: *[AIIMS PGMEE November 2012]*
(a) 1
(b) 0.4
(c) 0.3
(d) 0.75

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626. Blindness rate in India due to refractive errors
(a) 62.6% *[Recent Question 2014]*
(b) 19.7%
(c) .8%
(d) 6.2%

627. Arrange the causes of Blindness as per National Survey 2006-07 in India (increasing order of percentage) *[Recent Question 2015]*
(a) Refractive error, Glaucoma, Corneal opacity, Cataract
(b) Corneal opacity, Glaucoma, Refractive error, Cataract
(c) Cataract, Refractive error, Glaucoma, Corneal opacity
(d) Glaucoma, Refractive error, Corneal opacity, Cataract

Review Questions

628. WHO defines blindness if the visual acuity is less than: *[UP, 2006, Bihar 2004]*
(a) 3/60 *[Recent Question 2013]*
(b) 18/38
(c) 9/60
(d) 6/6

629. Prevalence of blindness in India is: *[Bihar 2004]*
(a) 0.1%
(b) 0.2%
(c) 0.5%
(d) 0.7%

630. Most common cause of ocular morbidity in India is:
(a) Cataract *[UP 2000]*
(b) Xerophthalmia
(c) Trachoma
(d) Refraction error

631. Most common cause of blindness due to easily preventable cause in children: *[RJ 2001]*
(a) Diabetes
(b) Trachoma
(c) Vit. A deficiency
(d) Cataract

MISCELLANEOUS (NON COMMUNICABLE DISEASES)

632. Stanford-three-community study, The North Kerelia project and Lipid Research Clinics study are types of:
(a) Cohort studies *[AIPGME 2004] [AIPGME 2004]*
(b) Nested case control studies
(c) Case series report studies
(d) Risk factor intervention trials

633. Most common cause of stroke in India is:
(a) Cerebral thrombosis *[AIIMS Dec 1994]*
(b) Cerebral embolism
(c) Cerebral hemorrhage
(d) Subarachnoid haemorrhage

634. Which one of the following is NOT a characteristic of non-communicable disease:
(a) Well-defined etiological agent
(b) Multifactorial causation *[AIPGME 1993]*
(c) Long latent period
(d) Variable onset

635. 'Rule of Halves' is seen in: *[AIIMS Nov 1993]*
(a) CHD
(b) Hypertension
(c) Blindness
(d) Accidents and Injuries

636. The preferred public health approach to control non-communicable diseases is: *[AIIMS Nov 02]*
(a) Shift the population curve of risk factors by a population based approach
(b) Focus on high risk individuals for reducation of risk
(c) Early diagnosis and treatment of indentified cases
(d) Individual disease based vertical Programmes

637. WHO STEPS is used for: *[AIIMS May 2009]*
(a) Communicable diseases *[Recent Question 2013]*
(b) Non- communicable diseases
(c) Immunodeficient diseases
(d) Auto-immune diseases.

638. Rural and urban population differ in incidence in all diseases *except*: *[AIPGME 2010]*
(a) Bronchitis (b) TB
(c) Lung cancer (d) Mental illness

639. Diabetes mellitus is best diagnosed by:
(a) Fasting blood sugar (FBS) > 100 mg/dl and Post-prandial blood sugar (PPBS) > 140
(b) FBS >125 mg/dl and PPBS >199 mg/dl
(c) HbA1c = 5.5% *[AIIMS November 2011]*
(d) FBS > 70 md/dl

640. True about Road traffic accidents: *[PGI May 2011]*
(a) Most common cause of accidental deaths in India
(b) More in USA in motor-car users than pedestrians
(c) More in number than self-inflicted injuries in India
(d) More in number than railway accidents in India
(e) Contribute 50% of all injury related deaths in India

641. In India causing maximum death among the following is: *[Recent Question 2013]*
(a) Drowning
(b) Road traffic accident
(c) Burns
(d) Poisoning

642. Most reliable test for screening of diabetes mellitus
(a) Random blood sugar *[Recent Question 2012]*
(b) Fasting blood sugar
(c) Glucose tolerance test
(d) Urine sugar

643. Accidents happening during weekends is
(a) Cyclic trends *[Recent Question 2014]*
(b) Seasonal trends
(c) Secular trends
(d) Point source epidemic

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644. According to NCRB Report 2014, Suicide rate in India is *[Recent Question 2015]*
(a) 1.1 per 100,000 population
(b) 10.6 per 100,000 population
(c) 25.8 per 100,000 population
(d) 30.9 per 100,000 population

645. According to NCRB 2014, Most common means of Suicide in India is *[Recent Question 2015]*
(a) Self-poisoning
(b) Self-immolation
(c) Drowning
(d) Hanging

646. Haddon matrix is related to *[AIIMS PG May 2015]*
(a) Hypertensive disorders
(b) Communicable diseases
(c) Maternal and child mortality
(d) Injury prevention

Review Questions

647. Which is the least common cause of heart disease in India? *[Bihar 2004]*
(a) Rheumatic
(b) Hypertensive
(c) Ischemic
(d) Congenital

648. Primordial prevention in myocardial infarction are all *except*: *[Bihar 2004]*
(a) Maintenance of normal body weight
(b) Change in life style
(c) Change in nutritional habits
(d) Screening for hypertension

649. Corpulence index measure: *[AIPGME 2004]*
(a) Hypertension
(b) Obesity
(c) Diabetes
(d) Malnutrition

650. Ischemic heart disease is associated with: *[AP 2003]*
(a) LDL
(b) VLDL
(c) HDL
(d) Chylomicrons

651. 'Smoking' is not associated with the following respiratory lesion: *[AP 2003]*
(a) Chronic bronchitis
(b) Sarcoidosis
(c) Emphysema
(d) Lung carcinoma

652. Following is not a risk factor for development of diabetes mellitus: *[MP 2001]*
(a) Sedentary life style
(b) Protein energy malnutrition in infancy
(c) Excessive intake of alcohol
(d) High intake of vitamin-A

653. The North Kerelia project evaluate risk factors of:
(a) Diabetes *[MP 2005]*
(b) Coronary heart disease
(c) Cancers
(d) Obesity

654. Glycosylated haemoglobin reflects the mean blood glucose level of previous: *[AP 2003]*
(a) 15 days
(b) 1 month
(c) 3 months
(d) 6 months

655. Ideal cholesterol level should be below: *[RJ 2005]*
(a) 200
(b) 220
(c) 300
(d) 350

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EXPLANATIONS

SMALLPOX AND CHICKENPOX

1. **Ans. (b) 6 days after onset of rash** *[Ref. Park 23/e p144]*
   - Period of communicability:
     - *Chickenpox:* 1 – 2 days before to 4 – 5 days after appearance of rash
     - *Measles:* 4 days before to 5 days after appearance of rash
     - *Diphtheria:* 14 – 28 days from disease onset
     - *Poliomyelitis:* 7 – 10 days before and after onset of symptoms

Also Remember

CHICKENPOX:
- Also known as 'Varicella'
- *Causative agent:* Varicella zoster virus [Human (alpha) Herpes Virus – 3]
- *Secondary Attack rate:* 90%
- *Incubation period:* 14 – 16 days
- *Rash:*

Chickenpox rash	Smallpox rash
Dew drop on rose petal appearance Centripetal distribution Pleomorphic rash	Centrifugal distribution Non-pleomorphic

- *MC late complication of Chickenpox:* Shingles (caused by reactivation of the virus decades after the initial episode of chickenpox)
- *Aspirin must not be given to children with chickenpox:* Risk of Reye's Syndrome
- *Strain of Live attenuated Chickenpox Vaccine:* OKA strain
- *Congenital Varicella:* Most threatening if transmitted in Ist trimester of pregnancy

2. **Ans. (a) Scabs are infective** *[Ref. Park 23/e p144-145]*

3. **Ans. (d) Cross-resistance existed with animal pox** *[Ref. Park 23/e p143]*
   Epidemiological Reasons/Basis For Smallpox Eradication:
   - No known animal reservoir
   - No long term carrier state
   - Infection provides lifelong immunity
   - Case detection simple due to characteristic rash
   - Subclinical cases did not transmit the disease
   - A highly effective vaccine was available
   - International cooperation

4. **Ans. (a) 10-30% chances of occurrence** *[Ref. Park 23/e p143-146]*
   - Single attack of Varicella gives durable (lifelong) immunity

5. **Ans. (d) 8th May 1980** *[Ref. K. Park 23/e p143]*

6. **Ans. (c) 90** *[Ref. K. Park 23/e p144]*

7. **Ans. (a) Live vaccine** *[Ref. K. Park 23/e p146]*

8. **Ans. (b) 2 days before and 5 days after rash appearance** *[Ref. Park 23/e p144]*

Review Question

9. **Ans. (a) Crusts contain live virus** *[Ref. Park 23/e p143-146]*

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MEASLES

10. Ans. (c) Not infectious in pro-dromal stage *[Ref. Park 23/e p146-150]*

MEASLES (RUBEOLA):

- *Period of Communicability:* 4 days before and 5 days after the appearance of rash (*Rash:* Retro-auricular origin)
  - Measles is highly infectious during pro-dromal period and during eruption
  - Period of communicability declines rapidly after appearance of rash
- Measles has no second attacks (life long immunity seen)

Also Remember

- WHO Measles elimination strategy comprises a 3-Part Vaccination strategy, 'Catch up, Keep up, Follow up'
  - *Catch up:* One time nationwide, vaccination campaign targeting all children 9 months to 14 years of age, irrespective of history of Measles disease or vaccination status
  - *Keep up:* Routine services aimed at vaccinating more than 95% of each successive birth cohort
  - *Follow up:* Subsequent nationwide vaccination campaigns conducted every 2 – 4 years targeting usually all children born after the catch-up campaign
- *Accelerated Measles Mortality Reduction Strategy (WHO-UNICEF):* Two doses of Measles containing vaccine (MCV) to all children through routine and supplementary immunization activities.

11. Ans. (d) SSPE *[Ref. Park 23/e p149]*

- Measles is not an unimportant infection: It does lead to several complications
- *Common complications of Measles:*
  - Diarrhoea
  - Pneumonia and other respiratory complications
  - *Otitis media*: MC complication of Measles in children
- *Serious complications of Measles:*
  - Febrile convulsions
  - Encephalitis
  - Sub-acute sclerosing pan-encephalitis (SSPE)
- *Sub-acute sclerosing pan-encephalitis (SSPE):*
  - Also known as 'Dawson's disease', 'Dawson's encephalitis'
  - Rare complication of Measles developing 7 – 10 years after Measles infection (Fatality 10–20%)
  - Characterised by progressive mental deterioration leading to paralysis (persisting virus in brain)
  - Frequency: 7 cases per million cases of natural Measles

Also Remember

- *MC complication of Mumps:* Aseptic meningitis

12. Ans. (c) Secondary attack rate is less than that of rubella *[Ref. Park 23/e p147]*

SAR of measles = 80% and Rubella = 90%

13. Ans. (a) Kopliks spots appear as rash disappears *[Ref. Park 23/e p147-148]*

MEASLES (RUBEOLA):

- *Incubation Period:* 10-14 days
- *Causative agent:* RNA paramyxovirus (so for only one serotype known)
- *Source of Infection:* cases (carriers are not known to occur)
- *Period of Communicability:* 4 days before and 5 days after the appearance of rash (Rash: Retro-auricular origin)
- Measles has no second attacks (life long immunity seen)
- *Secondary attack rate of Measles:* 80%
- *Measles shows a cyclical trend:* Increase every 2-3 years
- *Blood cell type predominantly infected in Measles:* Monocyte
- *Pathognomic clinical feature of Measles:* Koplik spots (on buccal mucosa opposite upper 2nd molar)
- *Pathognomic microscopic feature of Measles:* Warthin Finkledy cells (multinucleated giant cells)
- *MC complication of measles in young children:* Otitis media

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- *SSPE (Subacute Sclerosing Pan Encephalitis) is a rare complication of measles:* 7 per million cases of Measles (7-10 years after initial infection)
- *Epidemic of measles occur:* If proportion of susceptible children is >40%
- *If Measles is introduced in a virgin community:* it infects >90% children
- *Eradication of Measles:* Requires a vaccination coverage >96%
- *Baby measles (Exanthem subitum-roseola infantum):* Sixth disease (three day fever)
- German Measles: Rubella

Also Remember

- Measles is prevented by:
  - *Active immunization by measles vaccine:*
  - *Passive immunization by measles immunoglobulin*

14. **Ans. (b) Single intramuscular dose of 0.5 ml** *[Ref. Park 23/e pp148-149]*
15. **Ans. (a) Man** *[Ref. Park 23/e p146-148]*
16. **Ans. (a) Koplik spots appear in Prodromal stage; (b) Fever stops after onset of Rash; (c) Vaccine given at 9 months** *[Ref. Park 23/e p146-148]*
17. **Ans. (d) Catch up** *[Ref. K Park 23/e p148-149]*
18. **Ans. (a) Prodromal stage** *[Ref. K. Park 23/e p147-148]*
19. **Ans. (c) Meningoencephalitis** *[Ref. K. Park 23/e p147-148]*
20. **Ans. (b) Secondary bacterial infection** *[Ref. Infections of Central Nervous System by Scheld, 4/e p126]*
21. **Ans. (b) 3 days** *[Ref. Park 23/e p149]*
    - Post-exposure Measles vaccine must be given within: 3 days of exposure
      - IP for Naturally acquired Measles: 10 days
      - IP for Vaccine induced Measles: 7 days

Also Remember

- *Measles Outbreak Control Measures:*
  - Isolation for 7 days after Onset of rash
  - Immunization of contacts within 2 days of exposure
  - Immunoglobulin administration within 3-4 days of exposure (if vaccine contraindicated)
  - Prompt immunization at beginning of Epidemic

22. **Ans. (d) All of the above** *[Ref. WHO Measles Field Guide, p34]*
    - Supplemental Immunization Activities (SIAs)/ Mass immunisation campaigns: Necessary to reach never-vaccinated children who have never had measles disease and to provide an opportunity for a second dose for cases of primary vaccine failure
    - All children in the target age group and geographic area will be eligible to receive a dose of measles vaccine irrespective of past immunisation or history of clinical measles

Review Questions

23. **Ans. (d) 95** *[Ref. Park 23/e p148-149]*
24. **Ans. (a) 9 months** *[Ref. Park 23/e p148-149]*
25. **Ans. (d) All** *[Ref. Park 23/e p146-150]*
26. **Ans. (c) 4 days before and 5 days after the appearance of rash** *[Ref. Park 23/e p147-148]*
27. **Ans. (b) 10 days** *[Ref. Park 23/e p147]*
28. **Ans. (a) Both active and passive immunization are given simultaneously** *[Ref. Park 23/e p148-149]*
29. **Ans. (c) Give after 9 months age** *[Ref. Park 23/e p149]*

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RUBELLA

30. Ans. (a) Women 15-49 yrs *[Ref. Park 23/e p151]*

- *Priority groups for rubella vaccination in India:*
  - *1st PRIORITY:* 15 – 49 years reproductive age group females
  - *2nd priority:* All children 1 – 14 years age
  - *3rd priority:* Routine universal immunization of all children aged 1

Also Remember

- 'Forchheimer's sign' occurs in 20% of cases, and is characterized by small, red papules on the area of the soft palate

31. Ans. (a) 6-12 weeks of pregnancy *[Ref. Park 23/e p151]*

Congenital Rubella Syndrome (CRS):

- *CRS is said to have occurred if:*
  - Infant has IgM rubella antibodies shortly after birth, or
  - IgG antibodies persist for more than 6 months
- *Major determinant of extent of fetal infection in CRS:* Gestational age at which fetal transmission occurs,
  - *Infection in I trimester:* MOST DISASTROUS TIME
    1. Abortions
    2. Still births
    3. *Skin lesions:* blueberry muffin lesions
    4. 'Triad of Congenital Rubella Syndrome'
       i. Sensorineural deafness
       ii. Congenital heart defects (MC is PDA)
       iii. Cataracts
  - *Infection in early part of II Trimester:* Deafness (only)
  - *Infection after 16 weeks POG:* No major abnormalities
- *Risk of fetal damage in CRS:*

Stage of gestation	% fetuses infected	% fetuses damaged among infected	Overall risk of damage
< 11 weeks	90	100	90
11 – 16 weeks	55	37	20
17 – 26 weeks	33	0	0
27 – 36 weeks	53	0	0

- *Other manifestations of CRS may include:* spleen, liver or bone marrow problems, mental retardation, microcephaly, low birth weight, thrombocytopenic purpura (characteristic 'blueberry muffin' rash), hepatomegaly, micrognathia

32. Ans. (d) Infection after 16 weeks of gestation results in major congenital defects *[Ref. Park 23/e p151]*

33. Ans. (b) 15-18 months *[Ref. K. Park 23/e p151]*

Review Question

34. Ans. (c) Incubation period < 10 days *[Ref. Park 23/e p150]*

MUMPS

35. Ans. (c) Aseptic meningitis *[Ref. Park 23/e p152]*

36. (d) 18 days *[Ref. K. Park 23/e p152]*

INFLUENZA

37. Ans. (d) Major epidemics are due to antigenic drift *[Ref. Park 23/e p153-159]*

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INFLUENZA

- *Antigenic variations in Influenza:* (MC in Type A)

	Antigenic shift	Antigenic drift
Occurs due to	Genetic recombination/ re-assortment/ rearrangement	Point mutation
Nature	Sudden	Gradual/insidious
May lead to	**Epidemics/ Pandemics**	**Sporadic cases**

- *Incubation period:* 18 – 72 hours
- *Vaccines for Influenza:*
  - *Killed vaccines:*
    - 2 doses, 3 – 4 weeks apart, 0.5 ml (for age > 3 years), subcutaneous
    - 70 – 90% protective efficacy; duration 3 – 6 months
    - Is rarely associated with Guillain-Barré Syndrome (GBS)
  - *Live attenuated vaccines:*
    - Stimulate local + systemic immunity
    - Antigenic variations presents difficulties in manufacture
  - *Newer vaccines:*
    - *Split virus vaccine:* 'Sub-virion vaccine', lower antigenicity, fewer side effects
    - *Neuraminidase specific vaccine:* 'Subunit vaccine'
    - Recombinant vaccine

38. Ans. (a) split – virus vaccine; (b) neuraminidase; (e) recombinant vaccine *[Ref. K. Park 23/e p155]*

- *Newer Influenza Vaccines:*
  - *Split – virus vaccine:*
    - Also known as 'Sub-virion vaccine'
    - Lesser side effects
    - Useful for children
    - Highly purified
    - Less antigenic – multiple injections required
  - *Neuraminidase – specific vaccine:*
    - Sub-unit vaccine containing N-antigen
    - Permits subclinical infection – long lasting immunity
  - *Recombinant vaccine:*
    - Antigenic properties of virulent strain transferred to a less virulent strain

Also Remember

H1N1 (Swine flu) Vaccine:

- *H1N1 Inactivated vaccine:* Single i/m injection
  - *Strain:* A/California/7/2009 (H1N1) V like strain
  - *Storage temperature:* +2° to +8° C
  - *Contraindications:* History of anaphylaxis/severe reaction/Guillian-Barré Syndrome, Infants <6months, Moderate-to-severe illness with fever
  - Protective immunity: Develops after 14 days (NOT 100%)
- H1N1 Live attenuated vaccine: Nasal spray
  - Side effects: Rhinorrhoea, nasal congestion, cough, sore throat, fever, wheezing, vomiting
- Priority groups (in order) for Influenza vaccines:
  - Pregnant women
  - Age > 6 months with chronic medical conditions
  - 15-49 years healthy young adults
  - Healthy young children
  - Healthy adults 49-65 years
  - Healthy adults >65 years

39. Ans. (e) All ages and sex equally affected *[Ref. Park 23/e p154]*

40. Ans. (a) Affects all ages and sexes; (b) I.P. 18 – 72 hours *[Ref. Park 23/e p153-159]*

41. Ans. (d) H7N9 *[Ref. WHO H7N9 Avian Influenza 2013 document]*

42. Ans. (a) 1-3 days *[Ref. K. Park 23/e p156]*

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43. **Ans. Not of the Choices** *[Ref. K. Park 23/e p156]*

44. **Ans. (b) Man to man transmission is rare** *[Ref. Park 22/e p147]*

Reasons for H5N1 not becoming Global Pandemic

- Absence of efficient human to human mode of transmission (Major reason)
- Absence of replication in humans
- Absence of serious disease in humans

45. **Ans. (d) Ribavirin** *[Ref. Manson's Tropical Diseases, 23/e p223]*
    - Neuraminidase inhibitors such as Oseltamivir, Zanamivir, and Peramivir, which inhibit the viral enzyme neuraminidase in both influenza virus A and B, are effective for treatment and prophylaxis of influenza
    - Amantadine and Rimantadine are active only against Influenza A

DIPHTHERIA

46. **Ans. (c) 25 Lf of diphtheria toxoid are present per ml in DPT vaccine** *[Ref. Park 23/e p162]*
    - DPT VACCINE:

    Refer to Chapter 3, Theory

Also Remember

- *Tests of immunity status:*

Disease	Tests of immunity status	Antigen used
Diphtheria	Schick test	Schick toxin
Tuberculosis	Montaux test	PPD
Leprosy	Lepromin test	Dhamendra Antigen
Kala azar	Montenegro (Leishmanin) test	Leishmanin Antigen

47. **Ans. (b) Susceptibility to diphtheria** *[Ref. K. Park 19/e p137]*
    SCHICK TEST:
    - *Intradermal test to test:*
      - Presence of antitoxin (Immunity status)
      - Hypersensitivity to diphtheria toxin
    - *Test:* 0.2 ml (1/50 MLD) of schick test toxin intradermal in forearm and heat-inactivated toxin (control) in opposite forearm
    - *Interpretation of results of Schick Test:*

		Observation	
Test arm	**Control arm**	**Reading**	**Interpretation**
No reaction	No reaction	NEGATIVE	Immune to diphtheria
Red flush	No reaction	POSITIVE	Susceptible to diphtheria
Red flush fading by 4th day		PSEUDOPOSITIVE	Hypersensitivity
Red flush	Pseudopositive	COMBINED	Susceptibility and Hypersensitivity

      - *Schick test is Negative:* Serum antitoxin level > 0.03 units antitoxin per ml
      - *Schick test has been replaced by:* Hemagglutination Test
      - *Hemagglutination Test:* Measurement of serum antitoxin level

48. **Ans. (d) 70%** *[Ref. K. Park 22/e p151]*

49. **Ans. (b) Single dose of toxoid; (d) Daily throat swab culture** *[Ref. Park 23/e p161]*

Management of diphtheria contacts

- Immunisation:
  - If primary immunization or booster was received in previous 2 years: No further action

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  - If primary immunization or booster was received more than 2 years ago: 1 booster dose
  - If unimmunized contact: Active immunization + 1000-2000 units Antitoxin + Prophylactic penicillin/ erythromycin
- Examination:
  - Physical examination: Daily for 1 week after exposure
  - Throat swabbing: Weekly for several weeks

50. (c) 2-6 days & 10-14 days *[Ref. Park 23/e p161, 235]*

Review Questions

51. Ans. (a) Erythromycin *[Ref. Park 23/e p161]*

52. Ans. (d) Carrier of diphtheria *[Ref. Park 22/e p147]*

53. Ans. (a) Throat culture *[Ref. Park 23/e p160-161]*

54. Ans. (a) Immunity to diphtheria *[Ref. Park 20/e p145]*

WHOOPING COUGH

55. Ans. (a) 7-14 days *[Ref. Park 23/e p164]*

Also Remember

- *Incubation period:* Is the time interval between invasion by an infectious agent and appearance of first sign or symptom of disease
- *Median IP:* Is time required for 50% of cases to occur following exposure
- *Latent period:* Is the period from disease initiation to disease detection in non-infectious diseases
- *Serial interval:* Is gap in time between the onset of primary case and secondary case
- *Generation time:* Is the time interval between receipt of infection by a host and maximal infectivity of that host
- Communicable period: Is the time during which an infectious agent may be transferred directly or indirectly from an infected organism to others
- *Incubation period of Vaccine induced Measles:* 7 days
- *Quarantinable period for a disease:* Maximum incubation period
  - Healthy contact of Yellow fever is quarantined for 6 days (*IP:* 2 – 6 days)

56. Ans. (c) Erythromycin prevents spread of disease between children *[Ref. Park 23/e p163-165]*

Pertussis (Whooping Cough):

- Leukocytosis does not correlates with the severity of cough
- *Drug of choice:* Erythromycin (40 mg/kg QID X 10 days)
- *Vaccines:*
  - *DPT:*
    - Killed acellular bacilli 20,000 million per dose (0.5 ml)
    - Pertussis component leads to neurological complications after 2 years of age (@ 1 per 1,70,000 vaccinees)
    - Vaccine efficacy is 50 – 60 % (2 doses) and 70% (3 doses)
  - Pertussis killed whole cell vaccine
- DOC for cases and contacts: Erythromycin (for 10 days)

57. Ans. (c) Parapertussis causes more severe disease then pertussis *[Ref. Park 23/e p163-165]*

58. Ans. (a) Incubation period is 7-14 days; (c) Can affect any age; (d) Secondary attack rate in unimmunised persons is 90% *[Ref. K. Park 23/e p163-165]*

Review Questions

59. Ans. (a) Prophylactic antibiotic for 10 days *[Ref. Park 23/e p164]*

60. Ans. (c) 3-4 weeks *[Ref. Park 23/e p120]*

61. Ans. (a) Secondary attack rate 90%; (b); (d) *[Ref. Park 23/e p163]*

62. Ans. (a) Pertussis component *[Ref. Park 23/e p154, Park 22/e p156]*

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MENINGOCOCCAL MENINGITIS

63. Ans. (a) Causative agent is a gram –ve diplococci *[Ref. Park 23/e p165-167]*

Also Remember

Case Fatality Rate (CFR) of Meningococcal meningitis : 80%
- With early diagnosis and treatment, CFR declines to < 10%

- Meningococcal disease is endemic in India
- Treatment with Penicillin doesn't eradicate the carrier state in meningococcal meningitis
- Isolation of cases is not useful in epidemics of meningococcal meningitis as carriers outnumber case

64. Ans. (a) The source of infection is mainly clinical cases *[Ref. Park 23/e p165-167]*
- Carriers are the most important source of infection in meningococcal meningitis
  - Clinical cases present only a negligible source of infection

  Refer to Theory
- Carriers are more important source of infection than cases in:
  - Meningococcal meningitis
  - Diphtheria

65. Ans. (c) Vaccine prophylaxis of contacts of Xavier *[Ref. Park 23/e p166]*
- No vaccine prophylaxis can be given to contacts of Xavier as there is no effective vaccine available for Group B Meningococcus.

Also Remember

MENINGOCOCCAL MENINGITIS:
- *Causative agent:* Neisseria meningitidis
  - *Most lethal form:* B
  - *Epidemics:* A, C > B > W-135, Y
- *Reservoir:* Human beings (only)
- *Waterhouse-Friderichsen syndrome:* A massive, usually bilateral, hemorrhage into the adrenal glands caused by fulminant meningococcemia
- *Case fatality rate:* 80% (10% in early diagnosis and treatment)
- *Diagnosis:* Culturing the organism on a chocolate agar plate (*Specimen:* CSF)

66. Ans. (b) Young adolescents *[Ref. CDC Meningococcal Vaccine Guidelines 2014]*

Meningococcal Vaccine Recommendations:
- *Routinely:*
  - All adolescents 11-12 years age (1st dose at 11-12 years age, followed by Booster dose at 16 years age)
- *Other groups:*
  - Adolescents 13-18 years
  - Young people 19-21 years
  - 2 years and above (Splenectomized/ Chronic diseases/Lab workers/Travelers to endemic areas)

67. Ans. (b) Rifampicin *[Ref. K. Park 23/e p166]*

68. Ans. (b) 0.01% *[Ref. K Park 23/e p165]*

WHO Classification of Meningococcal areas:
- Low endemicity: < 2 cases per 100,000 population per year
- Moderate endemicity: 2-10 cases per 100,000 population per year
- High endemicity: > 10 cases per 100,000 population per year (0.01%)
- Epidemic: > 100 cases per 100,000 population per year (0.1%)

69. Ans. (a) ACW135Y *[Ref. K. Park 23/e p166-169]*

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70. **Ans. (a) A** *[Ref. Park 23/e p166; Clinical Pediatrics by Whitley, 2/e p854]*
    - Worldwide Group A is the MC cause of Meningococcal epidemics (Except in America), especially in Sub-Saharan African belt
    - Recently Group B, W-135, Y cases have started increasing in World

71. **Ans. (a) Fatality in untreated cases is 60%** *[Ref. Park 23/e p165-167]*

ARI

72. **Ans. (a) Very severe disease** *[Ref. Park 23/e p170-171]*
    - Inability to feed and severe malnutrition (weight 5 kg at 2 years age) makes the child as having Very Severe Pneumonia.

73. **Ans. (c) Classify as severe pneumonia, start antibiotics and refer urgently** *[Ref. Park 23/e p170-171]*
    - **In the given question,** a child aged 24 months weighed 11 Kg., respiratory rate was 38 per minute, chest indrawing was present,
    - Chest indrawing makes the child severe pneumonia, thus child will be referred immediately after giving first dose of referral antibiotic

Also Remember

- *Acute Respiratory Tract Infections (ARI) Control Programme:*
  - Started as a pilot project in 1990
  - Currently is a part of RCH Programme – II (2004 – 09)

74. **Ans. (b) Chest indrawing** *[Ref. K. Park 23/e p170]*

75. **Ans. (d) Very severe pneumonia** *[Ref. Park 23/e p170]*

    In the question, child 10 month has respiratory rate 48/minute (normal), and absence of chest indrawing (a feature of Severe pneumonia).

    But, child has weight 5 kg (Expected weight at 10 months age is 9-9.5 kg). So this child is Severe malnutrition according to Gomez classification

    Hence, it is a case of Very severe pneumonia

76. **Ans. (c) Oxygen saturation** *[Ref. Park 23/e p170-171]*

Review Question

77. **Ans. (d) 59** *[Ref. Park 23/e p170-171]*

TUBERCULOSIS

78. **Ans. (c) Lower deaths to < 1 per 100,000 population per year (by 2010)** *[Ref. Park 23/e p200]*

The Stop TB Strategy[Q]

- *Vision*: A TB-FREE WORLD
- *Goal*: To dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals and the Stop TB Partnership targets
- *Targets*:
  - *MDG 6, Target 8*: Halt and begin to reverse the incidence of TB by 2015
  - Targets linked to the MDGs and endorsed by the Stop TB Partnership:
    1. *by 2015Q*: Reduce prevalence and deaths due to TB by 50% compared with a baseline of 1990
    2. *by 2050Q*: Eliminate TB as a public health problem

The End TB Strategy 2016-2035[Q]

- *Vision*: A world free of TB
  - Zero deaths, disease and suffering due to TB

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- *Goal*: End the Global TB Epidemic

Indicators	Milestones[Q]		Targets[Q]	
	2020	2025	SDG 2030	End TB 2035
Reduction in number of TB deaths compared with 2015 (%)	35%	75%	90%	95%
Reduction in TB incidence rate compared with 2015 (%)	20% (< 85/100,000)	50% (< 55/100,000)	80% (< 20/100,000)	90% (< 10/100,000)
TB-affected families facing catastrophic costs due to TB (%)	Zero	Zero	Zero	Zero

Also Remember

- *3 by 5 Initiative:* Launched by WHO and UNAIDS on 1st Dec 2003
  - *Target:* To provide antiretroviral treatment (ART) to 3 million people living with HIV/AIDS (PLHA) in developing countries by end of 2005
  - *Ultimate goal:* To provide universal access to treatment for HIV/AIDS to all those who need it
- *Catch up – Keep up – Follow up strategy:* WHO Measles elimination strategy comprises a 3-Part Vaccination strategy:
  - *Catch up:* One time nationwide, vaccination campaign targeting all children 9 months to 14 years of age, irrespective of history of Measles disease or vaccination status
  - *Keep up:* Routine services aimed at vaccinating more than 95% of each successive birth cohort
  - *Follow up*: Subsequent nationwide vaccination campaigns conducted every 2 – 4 years targeting usually all children born after the catch-up campaign.
- *WHO Intensive PULSE strategy:* Is for prevention and control of Poliomyelitis
- *Roll Back Malaria Initiative:* Launched by WHO, UNICEF, UNDP and World Bank in 1998
  - Strengthen health system
  - Ensure proper and expanded use of insecticide treated bed nets (ITBN)
  - Ensure adequate access to basic healthcare and training of healthcare workers
  - Encourage simpler and effective means of administering medicines
  - Encourage development of more effective drugs and vaccines
- *SAFE Strategy:* Recommended by WHO for global elimination of blinding trachoma
  - Surgery
  - Antibiotic use
  - Facial cleanliness
  - Environmental improvement
- *12 by 12 initiative:* Hb level of girls aged 12 years above 12 gm% by 2012.
- *Accelerated Measles Mortality Reduction Strategy (WHO-UNICEF):* Two doses of Measles containing vaccine (MCV) to all children through routine and supplementary immunization activities
- *Right to Sight Initiative (VISION 2020):* To eliminate all causes of avoidable blindness by 2020
- *GET Initiative:* Alliance for Global Elimination of Trachoma by 2020

79. Ans. (c) Identify new converters to Tuberculin test *[Ref. Park 23/e p185-186]*

Also Remember

- *Tuberculin:* Purified protein derivative (PPD) has replaced the antigen old tuberculin (OT)
  - WHO advocates 'PPD-RT-23 with Tween-80'
  - *Dosage:* First strength (1TU), Intermediate strength (5TU), Second strength (250TU)
  - *Tuberculin test in use:*
    - *Mantoux intradermal test:* More precise test of tuberculin sensitivity
    - *Heaf test:* Quick, easy, reliable and cheap, preferred for testing large groups
    - *Tine multiple puncture test:* Unreliable, not recommended
  - *Tuberculin test conversion:* It is defined as an increase of 10 mm or more within a 2-year period, regardless of age
- *Mantoux test:*
  - *Dose:* 1 TU of PPD in 0.1ml injected intradermally on forearm

Contd...

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Contd...

  - Result read after 72 hrs (3d)
  - *Only induration is measured:*
    - *Induration > 9 mm:* Positive
    - *Induration 6 – 9 mm:* Doubtful (M. tuberculosis or Atypical mycobacteria)
    - *Induration < 6 mm:* Negative
  - Is a test of prognostic significance
- *Sputum smear examination (Z-N Staining) by direct microscopy:* It is the 'method of choice as a case finding tool for tuberculosis'
- *Sputum culture examination:* Is offered as a centralized service at district and regional chest clinic laboratories
  - only meant for chest symptomatic who are smear negative
  - useful for carrying out sensitivity tests and monitoring drug treatment
- *Mass Miniature Radiography (MMR):* Is not used now as a case finding tool.
  - only useful as an additional criterion for diagnosis of Pulmonary TB, when only one sputum smear is positive out of three to exclude bronchiectasis/ aspergilloma in frequent/ severe is positive sputum smear cases and in suspected complication in a breathless patient needing specific treatment (e.g. pneumothorax, pericardial effusion, pleural effusion)

80. Ans. (a) <1% in 0-14 group of children *[Ref. Park 21/e p169, Park 22/e p170]*

- *Control of a disease includes:*
  - Reducing incidence of disease
  - Reducing duration of disease (and risk of transmission)
  - Reducing the effects of infection (including physical and psychological complications)
  - Reducing financial burden to the community
- *WHO definition of TB control:* Prevalence of natural infection in the age group 0 – 14 years is of the order of 1%

81. Ans. (b) It may be negative in dissociated tuberculosis *[Ref. Park 23/e p185-186]*

Also Remember

- **Mantoux Test:**
  - 1 Tuberculin Unit (TU) in 0.1 ml
  - *False Reactions:*

False +ve Mantoux	False –ve Mantoux
Faulty technique of injection Using degraded tuberculin Too deep injection Infection of other mycobacterium Repeated tuberculin testing Prior BCG vaccine	Pre-allergic phase High fever High fever Measles and Chickenpox Whooping cough Malnutrition HIV/AIDS Use of anti-allergic drugs Use of immunosuppressants

82. Ans. (c) Tuberculin test *[Ref. Park 23/e p185-186]*

TUBERCULIN TEST:

- Discovered by Von Pirquet (1907)
- Tuberculin test is the 'only way of estimating the prevalence of infection in a population'
- Positive reaction to the test: evidence of past or present infection by M. tuberculosis
- Tuberculin test has lost its sensitivity as an indicator of the true prevalence of infection, in countries with high coverage of BCG; True prevalence rates are exaggerated by:
  - Infection with atypical mycobacteria
  - Boosting effect of a second dose of tuberculin

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83. Ans. (c) Bangalore *[Ref. K. Park 19/e p151, 20/e p161]*

Also Remember

- NEERI is credited with 'Nalgonda Technique' for defluoridation of water
- CDRI is credited with development of 'Centchroman', a non- hormonal non-steroidal oral contraceptive pill
- Location of headquarters of International health agencies.

International Health Agency	Location of Headquarters
WHO	Geneva, Switzerland
UNICEF	New York, USA
FAO	Rome, Italy
ILO	Geneva, Switzerland

84. Ans. (a) Incidence of infection *[Ref. Park 23/e p178]*

85. Ans. (c) 40% *[Ref. K. Park 20/e p160]*

- Prevalence of TB infection in India: 40%

86. Ans. (c) 20 – 30% *[Ref. Park 23/e p177]*

Tuberculosis Situation In India:

- *Country with highest TB burden in world*: India
- *Infected with TB (Mantoux positive):* Two out of five Indians (40%)
- *Annual risk of becoming infected with TB:* 1.5%
- *Lifetime risk of disease among infected:* 10%
- *Indians developing TB everyday:* 5000
- *Sputum positive every year:* 0.8 million
- *TB deaths per year:* 0.37 million

87. Ans. (a) 133 per 100, 000 *[Ref. Park 23/e p178]*

- *Incidence of TB:* Is percentage of new cases (confirmed by bacteriological examination) per 1000 population Incidence of TB = New cases /Total population × 1000

In the given question: New cases of TB are 22, and total population is 16, 500.
Thus, Incidence of TB = 22 / 16500 × 1000 = 1.33 per 1000 population
Or Incidence of TB = 133 per 100, 000 population

88. Ans. (d) It is assessed by tuberculin conversion in previously non-vaccinated children *[Ref. Park 22/e p168]*

- *Incidence of TB infection (Annual infection rate, Annual risk of infection ARI):* Percentage of population under study who will be newly infected (not diseased or cases) with TB among non-infected in 1 year
- Expresses attacking force of TB in community
- *In developing countries 1% ARI corresponds to:* 50 SS +ve cases per 100, 000 general population
- Tuberculin conversion index is the 'best indicator for evaluation of TB problem and its tentd' in the community
- *Current ARI in India:* 1.5%

89. Ans. (d) Social and environmental factors

- Thomas McKeown attributed the modern rise in the world population, AND DECLINE OF TB from the 1700sto the present to broad economic and social changes (especially diet and nutrition – "Nutritional Determinism") rather than to targeted public health or medical interventions

90. Ans. (d) INH 5 mg/kg for 6 months *[Ref. Park 23/e p198]*

- *Guidelines for Chemoprophylaxis in children (< 6 years) who come in contact with a Sputum positive TB case:*

IF	AND	THEN
Symptoms of TB	Clinician declares TB	Cat I DOTS given
No symptoms of TB	Tuberculin test NA	Isoniazid 5 mg/kg × 6 months
	Tuberculin test	Isoniazid 5 mg/kg × 3 months, then do test
		If induration < 6 mm: Stop INH, Give BCG
		If induration > 6 mm: Continue INH for 3 months

(*INH:* Isoniazid; NA: Not available)

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91. **Ans. (a) Ethambutol** *[Ref. K. Park 23/e p187]*
92. **Ans. (c) +++** *[Ref. K. Park 23/e p182]*
93. **Ans. (c) 10** *[Ref. K. Park 23/e p181]*
94. **Ans. (a) Sputum smear +** *[Ref. K. Park 23/e p178]*
95. **Ans. (c) Tuberculin test** *[Ref. K. Park 23/e p185]*
96. **Ans. (b) Inhalation** *[Ref. K. Park 23/e p181]*
97. **Ans. (a) Incidence of infection** *[Ref. K. Park 23/e p179]*
98. **Ans. (c) For assessing rifampicin resistance; (e) Diagnosis of TB** *[Ref. Tuberculosis: Diagnosis and Treatment by Timothy, 23/e p490]*
99. **Ans. (a) Prevent resistance** *[Ref. K. Park 23/e p187]*
100. **Ans. (a) 1 out of 2 sputum sample +ve [CURRENT GUIDELINES]** *[Ref. K. Park 23/e p182]*
101. **Ans. (c) Patient is infected with mycobacterium** *[Ref. K. Park 23/e p185]*
102. **Ans. (b) 3 weeks** *[Ref. Park 23/e p120]*
103. **Ans. (d) Children below 6 years** *[Ref. Park 23/e p195*
104. **Ans. (b) High prevalence of immunized people** *[Ref. Park 23/e p186]*
    - In countries with high coverage of BCG vaccine (India has 89% BCG coverage), which produces tuberculin hypersensitivity, Tuberculin test has lost its sensitivity as an indicator of true prevalence of infection
105. **Ans. (d) All of the above** *[Ref. Park 23/e p201-202]*

    TUBERCULOSIS AND DIABETES
    - Diabetes is an independent risk factor for Tuberculosis
    - Diabetes account for 15% of all Tuberculosis (21% of Smear +ve TB)
    - Higher 2-3 times risk of progression from Latent to Active TB
    - More severe clinical course
    - Late diagnosis
    - High risk of death in TB treatment
    - High risk of relapse after TB treatment
    - Higher risk of other infections
106. **Ans. (c) Resistant to INH and Rifampicin with or without resistant to other anti TB drugs** *[Ref. Park 23/e p179]*
107. **Ans. (a) Chennai** *[Ref. Park 23/e p427]*
108. **Ans. (c) Chronic alcoholism** *[Ref. Guidelines on the management of latent tuberculosis infection, WHO p13]*

    LATENT TUBERCULOSIS INFECTION (LTBI)
    - *Latent TB*: Latent tuberculosis infection (LTBI) is defined as a state of persistent immune response to stimulation by Mycobacterium tuberculosis antigens without evidence of clinically manifested active TB

SYSTEMATIC TESTING & TREATMENT **Strong recommendation** - People living with HIV - Contacts of pulmonary TB case - Anti-TNF treatment - Dialysis - Organ or hematologic transplantation - Silicosis **Conditional recommendation** - Prisoners - Health workers - Immigrants from high burden countries - Homeless persons - Illicit drug users	**LTBI testing procedures** - Interferon-gamma release assays (IGRA) - Mantoux tuberculin skin test (TST) **Systematic testing NOT recommended** - **D**iabetes - **H**armful alcohol use - **T**obacco smokers - **U**nderweight people [***M**nemonic*: **D**rugs **H**arm **U**nderage **T**eens]

Review Questions

109. **Ans. (b) 1 unit of PPD RT3** *[Ref. Park 23/e p185]*

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110. Ans. (a) Sputum + ve *[Ref. Park 23/e p182]*

111. Ans. (a) >10^4 bacilli are required in sputum for detection *[Ref. Park 23/e p182]*

112. Ans. (a) To delay the development of resistance *[Ref. Park 23/e p187]*

113. Ans. (a) 75 *[Ref. Park 23/e p177-178]*

114. Ans. (a) Live attenuated vaccine *[Ref. Park 23/e p196]*

115. Ans. (c) 10,000 *[Ref. Park 23/e p183]*

116. Ans. (c) With hold breast feeding *[Ref. Park PSM 20/e p161]*

POLIOMYELITIS

117. Ans. (a) Stool *[Ref. Park 23/e p203]*

- *Stool examination:*
  - Isolation of wild poliovirus from stool is *'the recommended method for laboratory confirmation of paralytic poliomyelitis'*
  - Recommended in every case of AFP
  - Virus usually can be found in the feces from onset to up to < 8 weeks after paralysis, with 'the highest probability of detection during the first 2 weeks after paralysis onset'

118. Ans. (a) Poliomyelitis in recipients; (b) Poliomyelitis in contacts of recipients *[Ref. Park 22/e p187-88]*

- OPV has a rare complication of Vaccine associated paralytic Poliomyelitis (VAPP)
  - *In vaccines:* 1 in 1 million
  - *In Close contacts of vaccines:* 1 in 5 million

Also Remember

- *Poliomyelitis situation 2013 WORLD [as on 01 March 2013]:*
  - *2 endemic countries:*
    - Afghanistan
    - Pakistan
  - *8 Vulnerable Countries:*
    - Cameroon – Syria – Ethiopia – Iraq
    - Somalia – Guinea – Sudan – Nigeria
- *Poliomyelitis situation 2015 INDIA*
  - *Total cases:* NIL wild virus case [No case has been reported in India from 13 January 2011 onwards] + 2 (all P2) VDPV case

119. Ans. (b) Last polio case in India was reported in 13 January 2011 *[Ref. NPSP GOI Website]*

CURRENT POLIO SITUATION 2015

- Current situation in India:
  - No wild case of Polio in India currently
  - Last case was reported on 13 January 2011
  - VDPV in India: 2 cases all P2
  - OPV is mostly used in India (Routine immunizations, as well as Pulse Polio Immunization)

120. Ans. (a) Type 3 is most common is India *[Ref. K. Park 23/e p204-205]*

121. Ans. (d) 1000 in children and 75 in adults *[Ref. K. Park 23/e p205]*

122. Ans. (d) mVDPV *[Ref. Park, 23/e p204]*

Vaccine derived polio virus (VDPV)

- Properties of VDPV:
  - Occurs due to Sabin (OPV) vaccine: P3 (60% of all cases) > P2 > P1
  - Clinical presentation indistinguishable from Wild polio virus (WPV)
  - cVDPV present similar public health threat like WPV
  - iVDPV prolonged infection may transmit virus to others

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- Incidence of VDPV: 4 cases per million birth cohort per year
- Types of VDPV:
  - cVDPV: Person-to-person transmission in community
  - iVDPV: Isolates from immunodeficient persons
  - aVDPV: Ambiguous from healthy person or sewage isolates
- Key risk factors for cVDPV emergence:
  - Development of immunity gaps (due to low OPV coverage)
  - Prior elimination of WPV types
  - Low routine immunization coverage with trivalent OPV
  - Insensitive AFP surveillance
- Diagnosis:
  - Real time Reverse transcription
  - PCR nucleic acid amplification

123. Ans. (d) 12 weeks *[Ref. Park 23/e p203]*

124. Ans. (b) Pakistan; (d) Afghanistan *[Ref. Polio Global Update, WHO International Website]*

125. Ans. (d) 4-30 days *[Ref. Human Viral Pathogens by Liu, 1/e p79]*
- Vaccine associated paralytic poliomyelitis (VAPP): Develop Paralytic Polio after 4-30 days of administration of OPV
- Poliomyelitis among Contacts of OPV: Develop within 7-60 days after exposure to recent OPV-recipient

126. Ans. (c) Serotype 3 *[Ref. Park 23/e p204]*
- VAPP/VDPV is MC associated with P3 (60%) > P2 > P1 of Sabin (OPV)

127. Ans. (c) Descending motor paralysis with preservation of tendon reflexes and absent sensation *[Ref. Park 23/e p206]*

Review Questions

128. Ans. (a) Virus *[Ref. Park 23/e p202]*

129. Ans. (a) Stabilizer *[Ref. Park 23/e p207]*

130. Ans. (a) Salk *[Ref. Park 23/e p206]*

131. Ans. (c) Can transmit it by nasal discharge *[Ref. Park 23/e p205]*

132. Ans. (c) It is contraindicated in immunocompromised patients *[Ref. Park 23/e p206]*

HEPATITIS

133. Ans. (b) Hepatitis E *[Ref. Park 21/e p197, Park 22/e p198]*
- *Types of Viral Hepatitis:*

Type	Causative agent	Incubation period	Common mode(s) of transmission
Hepatitis A	Enterovirus 72 (picornavirus)	15 – 45 days	Faecal-oral, sexual
Hepatitis B	Hepadnavirus	45 – 180 days	Sexual, perinatal, percutaneous
Hepatitis C	Hepacivirus (Flavivirus)	15 – 160 days	Percutaneous
Hepatitis D	Viriods like	30 – 180 days	Sexual, perinatal, percutaneous
Hepatitis E	Calcivirus (alphavirus like)	15 – 60 days	Faecal-oral

Also Remember

- *MC cause of fulminancy in viral hepatitis: Hepatitis D*
- *MC cause of chronicity in viral hepatitis: Hepatitis C*
- *MC cause of carriers in viral hepatitis: Hepatitis B*
- *MC cause of cancers in viral hepatitis: Hepatitis C*
- *Prognosis in viral hepatitis: Hepatitis A > Hepatitis E > Hepatitis D (acute) > Hepatitis C > Hepatitis D (chronic) > Hepatitis B*
- *Hepatitis caused by a DNA virus:* Hepatitis B
- *World Hepatitis Day:* May 19 (2008); July 28 (2011-14)

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134. Ans. (c) HBeAg *[Ref. Park 23/e p214-215]*

- *Markers of Hepatitis B infection (in order of appearance in serum):*
  - *HBsAg (Hepatitis B surface antigen):*
    - Also known as 'Australia antigen'
    - First antigen to appear in serum – 'first evidence of infection'
    - 'Epidemiological marker of Hepatitis B infection'
  - *HBcAg (Hepatitis B core antigen):*
    - Alone does not appear in serum
  - *HBeAg (Hepatitis B envelope antigen):*
    - Is a secretory form of HBcAg
    - 'Indicates active viral replication'
    - 'Is a marker of infectivity for Hepatitis B'
    - Persistence beyond 3 months: Increased likelihood of chronic Hepatitis B
  - *Anti-HBc (Antibody to Hepatitis B core antigen):*
    - First antibody to appear in serum
    - IgM Anti-HBc indicates a diagnosis of acute Hepatitis B
    - IgG Anti-HBc persists indefinitely
  - *Anti-HBe (Antibody to Hepatitis B envelope antigen):*
    - Signals 'stoppage of active viral replication'
    - Indicates 'end of period of infectivity'
  - *Anti-HBs (Antibody to Hepatitis B surface antigen):*
    - Last antibody to appear in serum
    - Signals 'recovery, end of period of communicability'

Also Remember

Persistent carrier state in Hepatitis B: Presence of HBsAg for > 6 months

- *Carrier rate of HBsAg in Indian population:* 5% (general population) – 10% (hospital staff)
- *Mother to child transmission (MTCT) of HBV:*
  - *In presence of HBeAg:* 90%
  - *In presence of HBsAg:* 20%
- *Antibody in serum after successful, vaccination against HBV:* Anti-HBs
- *Most sensitive marker of HBV viral replication and infectivity:* HBV DNA

135. Ans. (d) HBsAg *[Ref. Park 23/e p214-215]*

136. Ans. (a) Medical students screened before joining; (b) IV drug abuser are prone to infection; (d) Long term hemodialysis; (e) Interferon is treatment *[Ref. Park 23/e p217-218]*

HEPATITIS C:

- Is major cause of parenterally transmitted non-A, non-B hepatitis (PT-NANB)
- *Infection in world: 3% (Infection in blood donors in India:* 2%)
- Is a leading reason for liver transplantation
- Risk of maternal-neonatal transmission is small
- IP: 6 – 7 weeks
- *Chronicity:* 50%

137. Ans. (a) Cause mild illness in children *[Ref. Park 23/e p210-213]*

- *Key facts about Epidemiology of hepatitis A infection:*
  - *Causative agent:* Enterovirus 72 (Picorna virus)
  - *Disinfectant:*
    - Formalin
    - UV rays
    - Boiling for 5 min
    - Autoclaving
  - *Reservoir:* Human cases
  - *Period of infectivity:* 2 weeks before to 1 week after onset of jaundice

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- *Children:* More infected but mild or subclinical
- *Sex distribution:* Equal in both sexes
- *Modes of transmission:*
  - Faecal oral (Most common)
  - Parenteral
  - Sexual
- *Carrier stage and carcinoma (HCC):* Generally not seen in Hepatitis A

138. Ans. (a) HbsAg ; (c) Anti-HBc ; (d) HBeAg *[Ref. K. Park 23/e p215]*

- *Serologic patterns in Hepatitis B:*

HBsAg	Anti-HBs	Anti-HBc	HBeAg	Anti-HBe	Interpretation
+	–	IgM	+	–	Acute Hepatitis B
+	–	IgG	+	–	Chronic Hepatitis B + replication
–	+	IgG	–	+	Recovery from Hepatitis B
–	+	–	–	–	Vaccinated individuals

139. Ans. (a) Acute infectious Hepatitis B *[Ref. K Park 23/e p215]*

SEROLOGIC PATTERNS IN HEPATITIS B

HBsAg	Anti-HBs	Anti-HBc	HBeAg	Anti-HBe	Interpretation
+	–	IgM	+	–	Acute Hepatitis B
+	–	IgG	+	–	Chronic Hepatitis B + replication
–	+	IgG	–	+	Recovery from Hepatitis B
–	+	–	–	–	Vaccinated individuals

140. Ans. (d) E *[Ref. Wastewater Microbiology by Bitton, 4/e p189]*

141. Ans. (c) 3 weeks *[Ref. K. Park 23/e p120]*

142. Ans. (a) HBsAg; (c) Anti HBc; (d) HBeAg *[Ref. K. Park 23/e p215]*

143. Ans. (a) Hepatitis B vaccine + Immunoglobulin *[Ref. K. Park 23/e p216]*

144. Ans. (b) IgM Anti-HBc *[Ref. Park, 23/e p215]*

Acute Hepatitis B

- IgM Anti-HBc:
  - Diagnosis of Acute hepatitis B
  - Fills serologic gap between clearance of HBsAg and appearance of Anti HBs
  - Generally persist for 3-6 months
  - May also appear during flares of previously inactive Chronic hepatitis B
- IgG Anti-HBc:
  - Also appear during acute hepatitis B
  - Persist indefinitely

145. Ans. (c) Active and infectious Hepatitis B disease *[Ref. Park 23/e p215]*

HBsAg plus HBEAg in serum

- Acute hepatitis B
- Active and Infectious hepatitis B
- Chronic hepatitis B with Active viral replication (high infectivity)

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146. Ans. (d) HDVAg, IgM Anti-HDV, HDV RNA *[Ref. Liver Disease in Children by Frederick, 3/e p428]*

SEROLOGIC DIFFERENTIATION OF HEPATITIS B AND D

	IgM AntiHBc	HDVAg	IgM AntiHDV	HDV RNA
Acute HBV	+	–	–	–
Acute HDV coinfection	+	+	±	+
Acute HDV superinfection	–	+	+	+
Chronic HDV	–	–	+	+

147. Ans. (c) HBe Ag *[Ref. Park 23/e p214-215]*

Review Questions

148. Ans. (c) Two weeks before the symptoms and two week thereafter *[Ref. Park 23/e p211]*

149. Ans. (a) HBs Ag *[Ref. Park 23/e p213-214]*

150. Ans. (d) 50% or more *[Ref. Park 23/e p217-218]*

DIARRHOEAL DISEASES (CHOLERA AND TYPHOID)

151. Ans. (d) 24 hours *[Ref. Park 23/e p224]*

Oral Rehydration Solution ORS:

- *Reduced Osmolarity Oral Rehydration Solution (Low Na ORS):* WHO NEW ORS

Composition (grams)		Osmolar concentration (mmol/litre)	
Sodium chloride	2.6	Sodium	75
Potassium chloride	1.5	Potassium	20
Sodium citrate	2.9	Chloride	65
Glucose	13.5	Citrate	10
		Glucose	75
Total	**20.5**	**Total**	**245**

Also Remember

- ORS is the 'most important discovery of 20th century'
- As many as 90-95% of all cases of cholera and acute diarrhoea can be treated by oral fluids alone
- *Inclusion of trisodium citrate instead of sodium bicarbonate in WHO ORS:* Makes the product more stable and results in less stool output
- *Low Osmolarity ORS:* Reduces stool output by 20%, vomiting by 30% and need for unscheduled intravenous therapy
- *WHO/ UNICEF recommended oral rehydration formulation:* Reduced Osmolarity Oral Rehydration Solution (Low Na ORS)
- *Initial amount of ORS required for dehydration:* 75 ml per kg
- Intravenous rehydration:
  - *Ringer's lactate solution (Hartmann's solution):* Best commercially available solution
  - *Diarrhoea treatment solution (DTS):* WHO recommended ideal polyelectrolyte solution for intravenous solution
  - *Normal saline:* Poorest solution

152. Ans. (b) Oral rehydration therapy *[Ref. Park 23/e p225]*

- Intravenous rehydration infusion is usually required ONLY FOR initial rehydration of severely dehydrated patients who are in shock or unable to drink
  - **In the given question**, a 5 year old boy passed 18 loose stools in last 24 hours and vomited twice in last 4 hours, He is irritable BUT DRINKING FLUIDS,
  - Thus intravenous therapy is not indicated
  - Also plain water will not replace the salts lost in stools and vomiting
  - So, ideal treatment is Oral rehydration therapy

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153. Ans. (d) Safe water and sanitation *[Ref. Park 23/e p232-233]*

- Pattenkoffer advocated for improving local sanitary conditions as 'the best way to prevent or stop cholera epidemics'
- Robert Koch believed that quarantine and disinfection can only prevent cholera

154. Ans. (a) Tetracycline *[Ref. Park 23/e p233]*

Group	Antibiotic of choice
Treatment	
Adults	Doxycycline
Children	Azithromycin
Pregnancy	Azithromycin
Chemoprophylaxis	Tetracycline

155. Ans. (a) 10-14 days *[Ref. Park 21/e p213, Park 22/e p214]*

156. Ans. NONE [NOW Azithromycin, Earlier Furazolidone] *[Ref. Park 23/e p233]*

157. Ans. NONE (NOW Azithromycin, earilier Furazotidone) *[Ref. Park 23/e p233]*

- Cholera is an acute diarrhoel disease caused by Vibrio cholerae
  - Classical biotype
  - *El Tor biotype [Serotypes:* Ogawa (MC in India), Inaba and Hikojima]
- *Vibrio cholerae:* 'Gram-negative bacterium' that produces cholera toxin (enterotoxin), which act on c-AMP system of mucosal cells of epithelium lining of the small intestine (to cause massive diarrhea)
- *Incubation period:* 1 – 2 days (Few hours – 5 days)
- *Reservoir:* Human beings only
- *Essentials for treatment of cholera:* Water and electrolyte replacement (ORS)

Also Remember

- *Cholera stools appearance:* 'RICE WATERY diarrhoea'
- *Father of Public Health:* Cholera (although some regard John Snow as the same)
- *Most susceptible blood group to cholera:* Blood group O (> B > A > AB)
- *Recent most cholera outbreak:* Iraq (UN 2007)
- *History of cholera:*
  - *John Snow (1813-1858):* Found the link between cholera and contaminated drinking water (1854 using Spot maps)
  - Robert Koch identified V. cholerae with a microscope as the bacillus causing the disease (1885)
  - *Cholera morbus:* Used in 19th and early 20th centuries for both non-epidemic cholera and other gastrointestinal diseases (sometimes epidemic) that resembled cholera

158. Ans. (a) Increases shelf life *[Ref. Park 23/e p224]*

- *In WHO ORS, sodium bicarbonate has been replaced by trisodium citrate:*
  - Makes the product more stable
  - Results in less stool output (especially in high-output diarrhoea like cholera) as it increases intestinalabsorption of sodium and water

159. Ans. (c) 45 mmol/L *[Ref. OP Ghai 7/e p71-72, Park 23/e p232-233]*

160. Ans. (b) Isolation of Vi antigen *[Ref. Park 23/e p236-237]*

- *Laboratory Diagnosis:* **'BASU' Mnemonic**

Test of diagnosis	Time of diagnosis	Remarks
Blood culture	1st week	Mainstay of diagnosis
Antibodies (Widal test)	2nd week	Moderate sensitivity and specificity
Stool culture	3rd week	
Urine test	4th week	
Newer tests		

Contd...

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Contd...

IDL Tubex test		Detects IgM antibodies
TYPHI DOT		Detects IgM and IgG antibodies
TYPHI DOT-M		Detects IgM antibodies
DIPSTICK TEST		Detects IgM antibodies
Isolation of Vi Antigen		Detects carriers

Also Remember

- *In chronic cases of Typhoid, organisms persist in:* Gall Bladder and Biliary tract
  - Typhoid Mary, who gave rise to 1300 cases, was a chronic carrier
  - Vi antibodies are in 80%
  - *Most Successful approach to treatment:* Cholecystectomy + Ampicillin therapy
- Immunization doesn't give 100% protection

161. Ans. (a) Mass chemoprophylaxis *[Ref. Park 23/e p232-233]*

Also Remember

- Drugs for chemoprophylaxis:

Disease	Chemoprophylaxis
Cholera	Tetracycline/ Furazolidone
Bacterial conjunctivitis	Erythromycin ointment
Diphtheria	Erythromycin and 1st dose of vaccine
Influenza	Amantadine
Malaria	
< 6 WK	Doxycycline
> 6WK	Mefloquine
Meningococcal meningitis	Rifampicin
Plague	Tetracycline
Typhoid	NONE

- *Chemoprophylaxis is Primary level of prevention (Mode of Intervention:* Specific protection) as risk factors are present but disease has not yet taken place

162. Ans. (c) Doxycycline *[Ref. Park 23/e p233]*

163. Ans. (c) 14-21 days *[Ref. Park 23/e p230]*

- *Types of carriers in Cholera:*

Type of carrier	Duration	Remarks
Preclinical (incubatory)	1 – 5 days	Are potential patients
Convalescent	2 – 3 weeks	Not received effective antibiotic treatment
Contact (Healthy)	< 10 days	Due to subclinical infection; cause spread
Chronic	Up to 10 years	Gall bladder infected

164. Ans. (a) Cl- 111; (d) Lactate-29 *[Ref. Internet, Park 23/e p226]*

- *Composition of Ringer Lactate:*
  - Sodium ion: 130 mmol/L
  - Potassium ion: 4 mmol/L
  - Chloride ion: 109 mmol/L
  - Calcium ion: 1.5 mmol/L
  - Lactate ion: 28 mmol/L

165. Ans. (c) 800-1200 ml *[Ref. K. Park 23/e p226]*

166. Ans. (b) Male carriers though less are more dangerous *[Ref. K. Park 22/e p235]*

167. Ans. (b) 14 days *[Ref. Diarrhoeal Diseases Research, Volume 8, Number 4, p143]*

168. Ans. (d) 24 hours *[Ref. K. Park 23/e p225]*

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169. **Ans. (a) Sodium; (c) Glucose** *[Ref. K. Park 23/e p224]*

170. **Ans. (b) Moderate** *[Ref. Recent Advances in Paediatrics by Suraj Gupte, 1/e p181]*

171. **Ans. (b) 75** *[Ref. K. Park 23/e p224]*

172. **Ans. (b) 245** *[Ref. K. Park 23/e p224]*

173. **Ans. (c) 600-800 ml** *[Ref. K. Park 23/e p225]*

174. **Ans. (d) Total osmolarity – 300 mmol/l** *[Ref. K. Park 23/e p224]*

175. **Ans. (a) Started in Bangladesh; (c) Due to O139 El Tor; (e) Low proportion of adults in endemic regions** *[Ref. Medical Microbiology, Samuel Baron, 4/e chapter24]*

176. **Ans. (a) Safe water supply and sanitation** *[Ref. Park 23/e p232-233]*

177. **Ans. (d) 1:1** *[Ref. Park 23/e p204]*

178. **Ans. (c) Gangliosides + Adenyl cyclase** *[Ref. Park 23/e p231]*

CHOLERA ENTEROTOXIN

- *Light (L) toxin*: Binds with Ganglioside in Epithelial cell membrane
- *Heavy (H) toxin*: Activates Adenyl cyclase in Epithelial cell wall which increase cAMP, leading to outpouring of isotonic fluid in lumen of intestine

179. **Ans. (d) Typhoid** *[Ref. Park 23/e p236]*

COMMON DISEASES CHEMOPROPHYLAXIS

- *Bacterial Conjunctivitis, Pertussis, Diphtheria*: Erythromycin
- *Plague, cholera*: Tetracycline
- *Meningococcal meningitis*: Rifampicin > Sulfazine
- *Influenza*: Amantadine
- *Tetanus*: Penicillin
- *Malaria*: Doxycycline, Mefloquine

Review Questions

180. **Ans. (a) Ampicillin** *[Ref. Park 23/e p237]*

181. **Ans. (b) Male carriers though less are more dangerous** *[Ref. Park 23/e p235-237]*

182. **Ans. (a) 1, 3, 5 days** *[Ref. Park 23/e p238]*

183. **Ans. (c) Till 3 stool test are negative** *[Ref. Park 23/e p236]*

184. **Ans. (b) Cresol** *[Ref. Park 23/e p233]*

185. **Ans. (b) Potassium chloride** *[Ref. Park 23/e p224]*

WORM INFESTATIONS

186. **Ans. (b) Niridazole prevents transmission of the disease** *[Ref. Park 23/e p245-246]*

Also Remember

- Guineaworm is also known as 'medina worm'
- *Most effective larvicide for Guineaworm control:* Abate (Temephos)
- India was the first country to establish the National Guineaworm Eradication Programme (1983-84), as a centrally sponsored scheme (50 : 50 cost-sharing basis centre: state)

187. **Ans. (b) Hookworms** *[Ref. Park 23/e p243]*

- *Endemic Index (Chandler's Index):*
  - CI is average no of hookworm eggs per gram of faeces for the 'entire community'
  - *Interpretation of CI:*

Average no of eggs/gm stools	Interpretation
< 200	Not much significance
200-250	Potential danger
250-300	Minor public health problem
> 300	Important public health problem

  - Technique employed: Kato-katz Technique

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Also Remember

- Average blood loss in hookworm infection: 0.03 – 0.2 ml per worm per day
- Important human parasites:

Parasite	Causative organism	Parasite	Causative organism
Roundworm	Ascaris sp. Ascaris lumbricoides	Head louse	Pediculus humanus
Balantidiasis	Balantidium coli	Body louse	Pediculus humanus corporis
Tapeworm	Cestoda	Crab louse	Phthirus pubis
Coccidia	Cryptosporidium	Scabies	Sarcoptes scabiei
Guinea worm	Dracunculus medinensis	Strongyloidiasis	Strongyloides stercoralis
Amoebiasis	Entamoeba histolytica	Toxocariasis	Toxocara canis, Toxocara cati
Pinworm	Enterobius vermicularis	Toxoplasmosis	Toxoplasma gondii
Liver fluke	Fasciola hepatica	Trichinosis	Trichinella spiralis
Giardia	Giardia lamblia	Whipworm	Trichuris trichiura, Trichuris vulpis
Hookworm	Necator americanus, Ancylostoma duodenale		

188. Ans. (a) Man *[Ref. Park 23/e p303]*

189. Ans. (a) >300 *[Ref. K. Park 22/e p221]*

190. Ans. (a) Ankylostoma duodenale *[Ref. K. Park 23/e p221]*

191. Ans. (b) Monitoring individual treatment *[Ref. Park 22/e p221]*

192. Ans. (b) DDT *[Ref. Park 23/e p245-246]*

Review Questions

193. Ans. (a) Step wells *[Ref. Park 23/e p245-246]*

194. Ans. (c) Dangerous *[Ref. Park 21/e p221, Park 22/e p221]*

195. Ans. (b) Rajasthan *[Ref. Park 23/e p245-246]*

196. Ans. (b) Taenia solium *[Ref. Park 23/e p302-303]*

197. Ans. (c) No. of eggs of hookworm in per gram stool *[Ref. Park 21/e p221, Park 22/e p221]*

DENGUE

198. Ans. (d) Decreased hemoglobin *[Ref. Park 23/e p251]*

- *Classical dengue fever (DF):*
  - Also known as 'breakbone fever'
  - *Clinical features:* High grade fever (biphasic curve) with chills, intense headache, muscle and joint pains, retro-orbital pain, photophobia, colicky pain, abdominal tenderness, skin rash
- *Dengue hemorrhagic fever (DHF):* Severe form of DF, caused by infection with more than one dengue virus type
  - *Incubation period:* 4 – 6 days
  - *Clinical features:* Features of DF plus
    - Rash less common
    - Rising hematocrit value (> 20% of baseline)
    - Moderate-to-marked thrombocytopenia (< 1 lac/ mm3)
    - Hepatomegaly
    - *Positive tourniquet test:* > 20 petechiae per sq. inch
  - *Diagnosis of DHF:* Fever + hemorrhagic manifestations + thrombocytopenia + hemoconcentration or rising hematocrit

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- *Dengue shock syndrome (DSS):*
  - *Diagnosis of DSS:* DHF + shock [rapid and weak pulse, narrow pulse pressure (< 20 mm Hg)/ hypotension, cold clammy skin, restlessness]

199. Ans. (a) Aedes mosquito *[Ref. Park 23/e p247]*

200. Ans. ALL CHOICES *[Ref. Park 23/e p246-255]*

201. Ans. (c) Transovarian transmission of virus *[Ref. Park 23/e p247]*
- Aedes mosquito become infective by feeding on a patient from the day before onset to the 5th day (viraemia stage) of illness: After an extrinsic incubation period of 8-10 days, the mosquitoes become infective, it remains so for life
  - Transovarial transmission of dengue virus has been demonstrated in the laboratory

202. Ans. (a) Is the most common arboviral infection; (b) Can be both epidemic as well as endemic; (c) Can survive in ambient temperature; (e) Vector is Aedes aegypti *[Ref. Park 23/e p246-255]*
Refer to Theory

203. Ans. (a) Aedes aegypti *[Ref. Park 23/e p247]*
Also Refer to Theory

204. Ans. (c) Serotype 4 is more dangerous than other serotypes *[Ref. K. Park 23/e p246-255]*

205. Ans. (a) Lamivudine is drug of choice *[Ref. K. Park, 22/e p225; Infectious Diseases and Arthropods by J. Goddard, 2/e, p62]*
- Moderate to severe protein energy malnutrition reduces risk of DHF/DSS in dengue-infected children
- *Treatment of DHF*: None specific
  - Paracetamol
  - ORS, Oral fluids
  - I/V fluids, IV colloids
  - Blood transfusion

206. Ans. (d) Case management for DF and DHF, isolation and individual protection from mosquitoes and environmental measures for elimination of breeding places *[Ref. Park 23/e p254]*

Review Questions

207. Ans. (c) Shock *[Ref. Park 23/e p249-250]*

208. Ans. (c) Aedes aegypti *[Ref. Park 23/e p247]*

209. Ans. (d) Lifelong *[Ref. Park 23/e p247]*

210. Ans. (b) It is endemic in India *[Ref. Park 23/e p246-255]*

MALARIA

211. Ans. (d) Annual parasitic incidence *[Ref. Park 23/e p261]*
- *Annual parasitic incidence (API):* Sophisticated measure of malaria incidence in a community

$$\text{API} = \frac{\text{Confirmed cases during one year}}{\text{Population under surveillance}} \times 100$$

212. Ans. (a) Trophozoite *[Ref. Parasitology by KD Chatterjee, 12/e p86, Park 22/e p87]*
Modes of Malaria Transmission:
- Bite of female anopheline mosquitoes:
  - Infective forms: Sporozoites
- Injection of blood of a malaria patient containing asexual forms:'Trophozoite induced malaria'
  - Transfusion malaria
  - Congenital malaria
  - Malaria in drug addicts

213. Ans. (d) Quinine *[Ref. Anti malaria drug policy 2007]*

214. Ans. (d) Sulphadoxine + pyrimethamine *[Ref. Park 23/e p264]*

215. Ans. (a) 0.25 mg/kg body weight *[Ref. Anti malaria drug policy 2007, Park 23/e p263]*
Please Refer to New Guildelines (Annexure 12)

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Also Remember

- Mefloquine should be used ONLY in Plasmodium falciparum cases having proven resistance to chloroquine
- *Primaquine is contraindicated in:* pregnant women, infants, G6PD patients
- *Mass treatment of Malaria (WHO recommendation):* In highly endemic areas (API > 5 per 1000 population)
  - Mass prophylaxis in age < 5 years is not recommended

216. Ans. (b) Infant parasite site *[Ref. Park 23/e p261]*

217. Ans. (d) Spleen rate *[Ref. Park 23/e p261]*

218. Ans. (a) Primaquine *[Ref. Park 23/e p262-264]*

219. Ans. (a) Stephensi *[Ref. Park 23/e p259-260]*

220. Ans. (c) Merozoites *[Ref.Park 23/e p257-258]*

- *Peaks of fever in malaria coincide with* release of successive broods of Merozoites into the blood stream

221. Ans. (a) Anopheles stephensi *[Ref. Park 23/e p259-260]*

Vector	Disease(s) transmitted
Anopheles stephensi	Urban Malaria
Anopheles culicifacies	Rural Malaria
Phlebotamus argentipes	Kala azar (Visceral Leishmaniasis), Oriental sore (Cutaneous Leishmaniasis), Sandfly fever, Oroya fever
Aedes aegypti	Dengue, Chikungunya fever, Yellow Fever
Culex vishnuii	Japanese Encephalitis

222. Ans. (e) Mosquito acts as definitive host *[Ref. Park 23/e p257]*

- *Epidemiology of Malaria in India:*
  - Incubation period:

Malaria	Incubation period
Plasmodium vivax	14 days
Plasmodium falciparum	12 days
Plasmodium malariae	28 days
Plasmodium ovale	17 days

  - *Season:* Most common in July – November
  - *Definitive host:* Anopheles mosquito (*Intermediate host:* Man)
  - Is seen in both rural as well as urban areas
  - *Vector:* An. culicifacies (rural) and An. stephensi (urban)

223. Ans. (a) Anopheles stephensi; (b) Anopheles dirus *[Ref. Park 23/e p259-260]*

224. Ans. (b) Use of bed-nets *[Ref. Park 21/e p712-14, Park 22/e p716-18]*

- *Resurgence of Malaria in India has occurred due to:*
  - Drug resistance
  - Vector resistance
  - Mutation in parasite
- Use of bed-nets (primary level of prevention) is infact likely to reduce incidence of malaria

225. Ans. (d) Gujarat; (e) Orrisa *[Ref. Malaria Research Centre, India]*

- Plasmodium ovale has been reported from Baroda, Gujarat and Koraput, Orrisa in India

226. Ans. (a) 1.5 million cases annually; (b) Quinine drug of choice in severe malaria in pregnancy; (e) Falciparum malaria is most common type *[Ref. K. Park 23/e p255-264]*

227. Ans. (b) Artesunate *[Ref. K. Park 23/e p267-268]*

228. Ans. (d) Primaquine *[Ref. K. Park 23/e p267-268]*

229. Ans. (d) Reappearance of sexual stage parasitemia after treatment *[Ref. Malaria: A Traveller's Guide by Jamieson & Toovey 3/e p87]*

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- Malaria recrudescence: Reappearance of sexual stage parasitemia after treatment as shown by
  - Plasmodium falciparum
  - Plasmodium malariae

230. Ans. (d) Endogenous *[Ref. Park 23/e p58]*

231. Ans (c) June *[Ref. Park 22/e p387, Vivek Jain 7/e p319 Q249]*

- Anti-malaria month is observed every year in month of June prior to onset of monsoon and transmission season to enhance awareness and encourage community participation

Review Questions

232. Ans. NONE [NOW ALL ARE REPORTED IN INDIA] *[Ref. Park 23/e p257]*

233. Ans. (c) 10 – 14 days *[Ref. Park 23/e p260]*

234. Ans. (d) 3 round of malathione every 3 months *[Ref. Park 20/e p 360]*

235. Ans. (b) 5 *[Ref. Park 23/e p261]*

236. Ans. (a) Plasmodium *[Ref. Park 23/e p257]*

237. Ans. (b) 50% reduction *[Ref. Park 21/e p812, Park 22/e p816]*

238. Ans. (a) Female anopheles mosquito *[Ref. Park 23/e p260]*

239. Ans. (b) Anopheles fluvitalis *[Ref. Park 23/e p259-260]*

LYMPHATIC FILARIASIS

240. Ans. (a) Microfilariae *[Ref. Park 23/e p274]*

- *Chemotherapy of Filariasis:* Diethylcarbamazine (DEC)
  - Bancroftian filariasis: 6 mg/kg/day X 12 days (Total 72 mg/kg)
  - Brugian filariasis: 3-6 mg/kg/day X 6-12 days (Total 18-72 mg/kg)
- *DEC is effective in killing Mf:*
  - No effect on Infective (st age III) larvae
  - Uncertain effect on adult worm
- *DEC medicated salt:*
  - *Dose:* 1-4 gm DEC/kg of salt
  - Is a type of Mass Treatment (using very low dose of drug)
  - *Treatment duration:* 6-9 months
- National Filaria Control Programme (NFCP), 1955 is now a component of National Vector Borne Diseases Control Programme (NVBDCP), 2003-04
  - NVBDCP covers Malaria, Filariasis, Japanese Encephalitis, Kala Azar and Dengue

241. Ans. (a) Wuchereria bancrofti *[Ref. Park 23/e p270]*

- *Problem statement of Lymphatic filariasis:*
  - *Global:* Affects 120 million people in 120 countries; 1.1 billion people live in areas with risk of infection
  - *SEAR:* 600 million live in endemic areas; 60 million infected
  - *India:* Lymphatic filariasis is a major public health problem in India with 553 million people at risk in 233 districts; heavily endemic in UP, Bihar, Jharkhand, Andhra Pradesh, Orissa, Tamil Nadu, Kerala, Gujarat

Also Remember

- *Subcutaneous Filariasis:* It is caused by
  - Loa loa (the African eye worm)
  - Mansonella streptocerca
  - Onchocerca volvulus
  - Dracunculus medinensis (the guinea worm)

242. Ans. (b) DEC – 6 mg/kg/day x 12 days *[Ref. Park 23/e p274]*

243. Ans. (a) Culex fatigans *[Ref. Park 23/e p272]*

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244. Ans. (d) Lakshadweep islands *[Ref. Park 23/e p274-275]*
- DEC-medicated salt for mass treatment in lymphatic filariasis was shown to be safe, cheap and effective in: Lakshadweep islands

245. Ans. (c) Larvae are deposited on skin surface where they can't survive *[Ref. K. Park 23/e p270-275]*

246. Ans. (b) Tail end is free from nuclei and unsheathed *[Ref. K. Park 23/e p270-275]*

Review Questions

247. Ans. (b) Cyclodevelopmental *[Ref. Park 23/e p768]*

248. Ans. (d) 8 to 16 months *[Ref. Park 23/e p272]*

249. Ans. (b) 2015 [Now a proposal to make it 2017] *[Ref. Park 21/e p812, Park 22/e p816]*

RABIES

250. Ans. (d) Days 0, 7, 28 *[Ref. Park 23/e p280]*

Also Remember
- *World Rabies day:* September 28
- *First successful human antirabies vaccination performed by:* Louis Pasteur (1883)
- Serum antibodies take 7 days to appear after vaccination (Maximum level of Immunity achieved in days)
- *Best prophylaxis of Rabies in exposed persons:* Combined Vaccine and Immunoglobulin/ Serum treatment
- *Anti Rabies serum:*
  - *Horse Antirabies Serum*: 40 IU/ kg on Day 0 (50% in Wound, 50% i.m)
  - *Human Rabies Immunoglobulin:* 20 IU/kg (partly in wound, rest i.m gluteal)
- *Intramuscular injections of Cell Culture and Purified Duck Embryo Vaccines:* Deltoid (not in Buttocks)
- Volume of intradermal dose of Rabies Vaccine is 1/5th of intramuscular dose
- *Booster injections in Pre-exposure prophylaxis:* at intervals of 2 years

251. Ans. (a) Scratches without oozing of blood *[Ref. Park 23/e p279]*
- *Rabies occur due to:* Animal bites (dogs, cats, monkeys, cow, goat, sheep, buffalo, horses, bats, foxes, jackals, hyenas EXCEPT RAT BITE and HUMAN BITE)
- Human bites are likely to transmit: Streptococcus viridans, Staphylococcus aureus, Eikenella corrodens, Hemophilus influenzae, Fusobacterium nucleatum, Prevotella, Porphyromonas, Peptostreptococcus, HIV, Hepatitis B
- Rat bite can transmit: Streptobacillus monliformis, Spirillum minor

252. Ans. (c) Immediately stitch wound under antibiotic coverage *[Ref. Park 23/e p279]*
- *Bite wounds should not be immediately sutured to* prevent additional trauma, which may help spread of the rabies virus deeper into the tissues.
  - *If suturing is necessary, it should be done 24–48 hours later,* with minimal possible stitches, under cover of anti-rabies serum locally.
- *Rabies vaccine was first developed by:* Louis Pasteur (and Emile Roux)
- *Strain of Human Diploid Cell Vaccine:* Attenuated Pitman-Moore L503 strain
- *Induced Coma Treatment:* In 2005, the case of Jeanna Giese, a girl of 15 who survived acute, unvaccinated rabies was reported, indicating the successful treatment of rabies through induction of a coma

253. Ans. (c) Intracytoplasmic basophilic inclusion bodies are seen in brain cells *[Ref. Internet www.cdc.gov, Park 21/e p250-57, Park 22/e p251-56]*
- Incubation period of Rabies is 3 – 8 weeks (20–60 dasys)
- Patients of rabies could present atypically with aseptic meningitis
- Rabies may sometimes present as 'Convulsive Rabies'
- Negri bodies (Pathognomic of Rabies): Intracytoplasmic eosinophilic inclusion bodies in neurons. (Inside it contains basophilic formation)

254. Ans. (c) Anti rabies serum *[Ref. Park 23/e p280]*

255. Ans. (a) Lakshadweep Islands *[Ref. Park 23/e p277]*

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256. **Ans. (b) Mouse** *[Ref. Park 23/e p277]*

257. **Ans. (b) Hematogenous spread to brain** *[Ref. K. Park 23/e p277-279]*

258. **Ans. NONE [Current New Guidelines: 2-2-2-0-2]** *[Ref. Park 23/e p280]*

259. **Ans. (c) 3** *[Ref. K. Park 23/e p280]*

260. **Ans. (c) Fixed** *[Ref. K. Park 23/e p279]*

261. **Ans. (b) Dog** *[Ref. Park 23/e p277]*

262. **Ans. (b) Give cell culture derived vaccine** *[Ref. Park 23/e p279]*

263. **Ans. (c) 15 minutes** *[Ref. Park 23/e p278]*

LOCAL WOUND TREATMENT IN RABIES

- Purpose of local treatment is to remove as much virus as possible, from site of inoculation, before it is absorbed on local nerve endings
- Local wound treatment can reduce chances of Rabies by upto 80%
- Immediate flushing and washing wound area with plenty of soap and running water for minimum 15 minutes is of paramount importance
- *Suturing*: not recommended; if necessary, do 24–48 hours later under cover of Anti-rabies serum (Local application with prior sensitivity testing)
- Chemical treatment with virucidal agents (Alcohol, tincture, 0.01% aqueous iodine)

Review Questions

264. **Ans. (c) Australia** *[Ref. Park 23/e p277]*

265. **Ans. (c) Britain** *[Ref. Park 23/e p277]*

266. **Ans. (d) Recombinant glycoprotein vaccine** *[Ref. Gupta and Mahajan 3/e p299]*

267. **Ans. (c) Class III** *[Ref. Park 23/e p279]*

268. **Ans. (a) It is a DNA virus** *[Ref. Park 23/e p276-281]*

269. **Ans. (a) Sheep** *[Ref. Park 23/e p279]*

270. **Ans. (b) Andaman and Nicobar Islands** *[Ref. Park 23/e p277]*

271. **Ans. (b) 10 days** *[Ref. Park 23/e p279]*

YELLOW FEVER

272. **Ans. (a) 3 to 6 days** *[Ref. Park 23/e p283]*
    - Incubation Period: 3 – 6 days
        - IP of 6 days recognized under International Health Regulations

273. **Ans. (b) Fatality rate > 90%** *[Ref. Park 23/e p282-284]*

274. **Ans. (a) 1%** *[Ref. Park 23/e p199, 283]*
    - *International Health Regulations (IHRs) of WHO covers 7 diseases:*
        - Cholera
        - Plague
        - Yellow Fever
        - Smallpox
        - Wild Polio Virus
        - Human Influenza
        - SARS
    - *International measures to restrict the spread of Yellow Fever (IHRs):*
        - *Travellers:*
            - Must possess a valid International certificate of vaccination (validity 10days – 10yrs) against YF before they enter 'YF receptive areas'
            - *If no such certificate available:* Quarantine for 6 days (Max I.P of YF) from date of leaving an infected area
            - *If traveller arrives before certificate becomes valid (10 days after vaccination):* Isolate till it becomes valid

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- *Mosquitoes:*
  - *Aircrafts/ships arriving from endemic areas:* Aerosol spray to kill insect vectors
  - *Airports/ seaports kept free from vector breeding:* at least 400 meters around boundary
  - *Aedes aegypti index:* kept below 1%

Also Remember

Reference centres for YF in India:
- National Institute of Virology (NIV), Pune
- Central Research Institute (CRI), Kasauli

- *Indices of Surveillance of Aedes mosquitoes:* Refer to Ans. 146, Theory
  - Breteau Index (Aedes aegypti index) should be < 1% in towns and seaports in endemic areas to ensure freedom from Yellow Fever

275. Ans. (d) Incubation period is 16-46 days *[Ref. Park 23/e p282, 284]*

276. Ans. (d) 17D *[Ref. Park 23/e p283]*

277. Ans. (b) Transmitted by Aedes; (d) Incidence is increased by humidity; (e) It is a Flavivirus *[Ref. Park 23/e p282-284]*

278. Ans. (b) 10 years *[Ref. K. Park 23/e p284]*

279. Ans. (b) 10 days *[Ref. K. Park 23/e p83]*

280. Ans. (c) Validity of vaccine 6 years *[Ref. K. Park 23/e p282-284]*

281. Ans. (b) 1% *[Ref. K. Park 23/e p283]*

282. Ans. (b) 10 years, starting from 10 days after vaccination *[Ref. K. Park 23/e p283]*

283. Ans. (d) Aedes aegypti index should not be more than 10% to ensure freedom from yellow Fever *[Ref. Park 23/e p282-284]*

- *Indices of Surveillance of Aedes Mosquitoes:*

$$\text{Container Index} = \frac{\text{Not of containers showing breeding of Aedes larvae}}{\text{Total no of containers surveyed}} \times 100 = \frac{C^+}{C} \times 100$$

$$\text{House index} = \frac{\text{No of house showing breeeding of Aedes Larvae}}{\text{Total no of Houses surveyed}} \times 100 = \frac{H^+}{H} \times 100$$

$$\text{Breteau Index} = \frac{\text{No of containers showing breeding of Aedes Larvae}}{\text{Total no of houses surveyed}} \times 100 = \frac{C^+}{H} \times 100$$

- Breteau Index (Aedes aegypti index) should be < 1% in towns and seaports in endemic areas to ensure freedom from Yellow Fever

Also Remember

- *India is a 'Yellow Fever receptive' area:* Population is unvaccinated and susceptible to Yellow Fever. Vector Aedes aegypti is also found in abundance. Common monkey of India (Macacus spp) is also susceptible
- International Health Regulations(IHR) covers 7 diseases:
  - Cholera
  - Plague
  - Yellow Fever
  - Smallpox
  - Wild Polio Virus
  - Human Influenza
  - SARS
- *Thermolability of vaccines:* sensitivity to heat
  Reconstituted BCG > YF > OPV > Measles and Reconstituted Measles > Hep B > DPT > DT > BCG > TT
  - *Most Thermolabile vaccine:* Reconstituted BCG
  - *Most Thermostable vaccine:* TT
- *Vaccines contraindicated in pregnancy:* All Live Vaccines (except Yellow fever) and Meningococcal Vaccine.

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Review Questions

284. Ans. (a) Birth and death registration act *[Ref. Park 21/e p779, Park 22/e p783]*

285. Ans. (b) Central institute, Kasauli *[Ref. Park 23/e p284]*

JAPANESE ENCEPHALITIS

286. Ans. (c) Case fatality rate is over 90% *[Ref. Park 23/e p285-286]*

- *Vectors of JE:* Culicine mosquitoes and some Anophelines
  - Culex tritaeniorhynchus (most important vector), Culex vishnuii and Culex gelidus
- *Case fatality rate:* 20 – 40% (may reach upto 58%)

Also Remember

- JE has been reported by 26 states and UT's in India
  - Gorakhpur District of UP contribute the largest no of cases

287. Ans. (d) Epidemic is declared if there are 2-3 cases in a village *[Ref. Park 23/e p285-287]*

- 85% of cases of JE are reported in age below 15 years BUT JE IS INFREQUENT IN INFANCY: Vaccination not recommended below 6 months age infants (as also interference from maternal antibodies)
- *Not all humans bitten by mosquitoes develop the disease:* Ratio of JE overt disease to inapparent infection varies from 1:300 to 1:1000
- *Endemicity of JE in India:* 1-2 cases per village

288. Ans. (a) Pigs-Mosquito *[Ref. K. Park 23/e p285]*

289. Ans. (b) Pigs *[Ref. K. Park 23/e p285]*

290. Ans. (a) Culex *[Ref. K. Park 23/e p285]*

291. Ans. (d) In endemic areas, vaccination is given to cover children 1-9 years age *[Ref. Park 23/e p286]*

JAPANESE ENCEPHALITIS VACCINES

- *Mouse brain derived inactivated vaccine*:
  - 2 primary doses 4 weeks apart, booster after 1 year and subsequently at 3 yearly intervals until the age of 10-15 years
  - *Dose*: 0.5 ml for children aged < 3 years (1 ml for age > 3 years)
  - *Route*: Subcutaneous
- *Pre-exposure prophylaxis*: 3 Primary doses on day 0, 7, 28 (OR 2 primary doses 4 weeks apart); then Booster after 1 year and then every 3 years
- *Cell culture based Live attenuated vaccine (SA-14-14-2 strain)*:
  - Single dose, followed by Single booster dose after 1 year

Also Remember

- In endemic areas, JE vaccine is given to all children aged 1-15 years age
- JE vaccine is not used below the age of 6 months:

Review Questions

292. Ans. (a) Man to man transmission *[Ref. Park 23/e p285]*

293. Ans. (c) Large no. of in apparent infections *[Ref. Park 23/e p285]*

KFD

294. Ans. (b) Deforestation *[Ref. Park 23/e p287-288]*

- *Control measures:*
  - Control of ticks
  - Restriction of cattle movement
  - *Vaccination:* Killed KFD vaccine
  - *Personal protection:* through repellants

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Also Remember

- KFD belongs to 'Biosafety Level 4', highest risk category of pathogens

295. Ans. (b) Haemaphysalis *[Ref. Park 23/e p287-288]*

- *Vectors of KFD:*
  - *In India:* Hemophysalis spinigera (Hard Tick)
  - *Outside India:* Soft Tick
- *Tick as vectors:*

Hard tick as vector	Soft tick as vector
KFD (in India)	Q fever (in few animal cases)
Tularaemia	Relapsing fever
Babesiosis	KFD (outside India)
Tick paralysis	
Viral encephalitis	
Tick hemorrhagic fevers	

296. Ans. (d) Hard tick *[Ref. Park 23/e p288]*

PLAGUE

297. Ans. (a) Domestic rat "Rattus rattus" has been incriminated as main reservoir *[Ref. Park 23/e p292-297]*

Also Remember

- Pneumonic plague is the most virulent and least common form of plague
- *Recent most outbreak of Plague:* Village Dangud, Uttrakashi district, Uttrakhand (2004)
- Man has no natural immunity against Plague
- A Rat flea may ingest upto 0.5 cu.mm of blood (containing as many as 5000 bacilli)
- A partially blocked flea is more efficient transmitter of Plague than a totally blocked flea as it can live longer
- 'Liasion rodents' between man and field rodents: Commensal rodents especially the peri-domestic species (eg. R.norvegicus)
- *Most effective method to break chain of transmission of Plague:* Destruction of Rat fleas (by proper application of an effective insecticide)
- *For effective control of Plague by insecticidal sprays:* Flea Index should drop down to zero within 48hrs of application
- *WHO recommendation on Plague vaccination:* should be only for prevention and NOT FOR CONTROL of human plague

298. Ans. (b) Control of fleas *[Ref. Park 23/e p295]*

299. Ans. (b) Bubonic is the most common variety *[Ref. Park 23/e p295]*

300. Ans. (c) 28 years *[Ref. K. Park 20/e p256]*

- Since the last reported cases in Karnataka in 1966, there have been no laboratory confirmed cases in India, till its reappearance in 1994 (Gap of 28 years)
- In 1994, Bubonic Plague (Beed, Maharashtra) was followed by an outbreak of Pneumonic Plague (Surat, Gujarat)
  - Overall 4780 suspected cases, 167 confirmed cases and 53 deaths
- In February 2002, outbreak of Pneumonic Plague (Gap of 8 years) in Hat Koti village, Shimla district, Himachal Pradesh
  - Overall 16 cases and 4 deaths
- In October 2004, Outbreak of Bubonic Plague in Dangud village, Uttarkashi, Uttrakhand.
  - Over all 8 cases and 3 deaths.

301. Ans. (b) Cheopsis index *[Ref. Park 23/e p294]*

302. Ans. (b) Cheopsis index *[Ref. K. Park 23/e p294]*

Review Questions

303. Ans. (a) Average number of cheopis per rat *[Ref. Park 23/e p294]*

304. Ans. (b) Pneumonic plague *[Ref. Park 23/e p295]*

305. Ans. (c) 40 IU per kg of body weight *[Ref. Park 23/e p280]*

306. Ans. (c) Rat flea *[Ref. Park 23/e p295]*

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RICKETTSIAL DISEASES

307. Ans. (b) Scrub typhus – Flea *[Ref. Park 23/e p299]*

Also Remember

- 'Brill Zinnser Disease' is the recrudescent form of Epidemic Typhus (Louse borne typhus)
- *Drug of choice for Rickettsial diseases:* Tetracycline

308. Ans. (c) Rickettsia prowazekii *[Ref. Park 23/e p301]*

309. Ans. (b) Flea is a vector of the disease *[Ref. Park 23/e p299-300]*

310. Ans. (c) Inhalation of aerosol *[Ref. Park 23/e p301]*

- *Modes of Transmission of few important diseases:*

Disease	Mode(s) of transmission
Leptospirosis	Direct contact with urine/ tissue of infected animal, contaminated food or water, droplet infection
Leprosy	Droplet infection, contact transmission, breast milk, insect vectors, tattoo needles, vertical transmission
Hepatitis A	Faecooral route, Parenteral, Sexual
Legionnaire's disease	Contaminated air conditioning supply
Plague	Bite of Flea (Xenopsylla)
Yaws	Non-venereal direct contact, fomites, vectors
Ancylostomiasis (Hookworm)	Direct penetration through skin, oral
Q fever	Inhalation of infected dust, Meat and milk products
Hydatid Disease (Echinococcus)	Food, water contaminated with eggs

311. Ans. (d) Epidemic typhus *[Ref. Park 23/e p301]*

312. Ans. (d) Weil Felix reaction is very useful for diagnosis *[Ref. Park 23/e p300]*

313. Ans. (b) Rocky mountain spotted fever *[Ref. Park 23/e p299]*

314. Ans. (b) Adult mite feeds on vertebral host *[Ref. Park 23/e p300]*

- In Scrub typhus the nymphal and adult stages of the mite are free living in nature, they do not feed on vertebrate hostst
- Larvae (chigger) feed on vertebrate hosts' and pick up rickettsiae
- Larval stage 'act as a both reservoir and a vector'

315. Ans. (a) Flea ; (b) Louse ; (d) Mite *[Ref. Park 23/e p300]*

316. Ans. (a) Rickettessia prowazki & louse *[Ref. K. Park 23/e p299]*

317. Ans. (a) Louse *[Ref. Medicine at a Glance by Davies, 3/e p446]*

318. Ans. (b) Rickettsia akari *[Ref. K. Park 23/e p299]*

319. Ans. (a) Flea *[Ref. K. Park 23/e p299]*

Review Questions

320. Ans. (b) Mite *[Ref. Park 23/e p299]*

321. Ans. (b) Louse *[Ref. Park 23/e p299]*

322. Ans. (a) R. prowazekii *[Ref. Park 23/e p299]*

323. Ans. (c) Coxiella burnetii *[Ref. Park 23/e p299]*

324. Ans. (b) Scrub typhus *[Ref. Park 23/e p299]*

325. Ans. (c) Q-fever *[Ref. Park 23/e p299]*

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326. Ans. (d) Indian tick typhus *[Ref. Park 23/e p300-301]*

327. Ans. (d) Q-fever *[Ref. Park 23/e p301]*

LEISHMANIASIS

328. Ans. (c) Aldehyde Test of Napier is a good test for diagnosis *[Ref. Park 23/e p304-308]*

- *Reservoir of Infection:* Dogs, jackals, foxes, rodents and other mammals
  - Indian Kala Azar is a non-zoonotic infection: Man as reservoir
- *Aldehyde Test of Napier:*
  - Becomes Positive after 2-3 months of disease onset and reverts to negative 6 months after cure
  - Useful Test for surveillance (but not for diagnosis)
  - *Non- specific test:* Positive in many chronic infections where albumin: globulin ratio is reversed
- There are no drugs available for personal prophylaxis of Kala azar

Also Remember

- *Kala Azar is characterized hematologically by:*
  - *Reversed albumin:* globulin ratio
  - Progressive leucopenia, anemia
  - Increased IgG
  - *Low WBC:* RBC ratio
  - Increased ESR
- *Leishmania Bodies:* Amastigote forms of Leishmania in vertebrates
  - Flagellated promastigotes are seen in insects
- *Kala azar is known as 'Black Sickness':* pigmented of face, hands, feet and abdomen
- *Canine Vector Borne Diseases (CVBD):* Canine diseases transmitted by parasitic vectors
  - Anaplasma (e.g., Anaplasma phagocytophilum)
  - Babesiosis
  - Bartonellosis
  - Dirofilaria (heartworm)
  - Ehrlichiosis
  - Leishmaniasis
  - Lyme disease
  - Meningoencephalitis

329. Ans. (a) Man *[Ref. Park 23/e p305]*

LEISHMANIASIS:

- Leishmaniasis is also known as Leichmaniosis, Leishmaniose, *Orient Boils, Baghdad Boils, kala azar, black fever, sandfly disease, Dum-Dum fever, Espundia, White Leprosy*
- *Leishmaniasis* is diagnosed in the haematology laboratory by direct visualization of the amastigotes (Leishman-Donovan bodies)
- *Reservoir(s) of important diseases:*

Disease	Microorganism	Reservoir (s)
Epidemic Tyhus	Rickettsia prowazekii	Humans
Endemic Typhus	Rickettsia typhi	Rats
Scrub Typhus	Rickettsia tsutsugamushi	Trombiculid Mite
Indian Tick Typhus	Rickettsia conori	Rodents
RMSF	Rickettsia rickettsii	Rodents
Rickettsial Pox	Rickettsia akari	Mice
Trench fever	Bartonella quintana	Humans
Q fever	Coxiella burnetti	Cattle, sheep, goat
Dracunculiasis	Dracunculus medinensis	Humans
Ascariasis	Ascaris lumbricoides	Humans
Ancylostomiasis	Ancylostoma duodenale	Humans

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330. Ans. (c) Hydroxychloroquine *[Ref. Internet]*

- Sitamaquine is a new once-a day oral drug for treatment of Kala azar
- Miltefosine and paramomycin have been recently included in Kala Azar Control component of NVBDCP

Review Questions

331. Ans. (c) Phlebotomus argentipes *[Ref. Park 23/e p305]*

332. Ans. (b) Dog is the reservoir of infection *[Ref. Park 23/e p305]*

333. Ans. (d) Man has flagellar stage of organism *[Ref. Park 23/e p304-308]*

TRACHOMA

334. Ans. (a) Screening *[Ref. National Health Programs of India by Dr. J. Kishore, 7/e p368, 8/e p428]*

- WHO has recommended 'SAFE Strategy' for global elimination of blinding trachoma:
  - *Surgery:* for Trichiasis and Entropion
  - *Antibiotic use:* Azithromycin is Drug of choice
  - Facial cleanliness
  - Environmental improvement

Also Remember

- *WHO recommended strategy for measles elimination:* 'Catch up – Keep up – Follow up strategy'
- *WHO recommended strategy for polio eradication:* 'Pulse strategy'
- *GET 2020:* The Alliance for the 'Global Elimination of Blinding Trachoma' by the year 2020 (GET 2020)

335. Ans. (c) Irritants like kajal or surma also predispose *[Ref. Park 23/e p308-310]*

TRACHOMA (ROUGH EYE):

- *Communicability:* Trachoma is a disease of low infectivity
- Predisposing factors: Direct sunlight, dust, smoke and irritants (such as kajal or surma)
- *Mode of transmission:*
  - Direct or indirect contact with ocular discharges or fomites
  - Eye seeking flies
  - Venereal transmission
- *Treatment of choice for Trachoma:* Azithromycin 20mg/kg oral stat
- *Mass treatment for Trachoma:* [NEW GUIDELINES–WHO]
  - Indication of mass treatment:[3] 10 % prevalence of severe and moderate Trachoma in children < 10yrs of age
- *Treatment:* 1% tetracycline ointment BD for 5 consecutive days each month or OD for 10 days each month for 6 consecutive months, or for 60 consecutive days.

Also Remember

- *MC infected age group:* 2-5 yrs aged children

336. Ans. (c) Children aged 0-10 years *[Ref. National Health Programs of India by Dr. J. Kishore, 7/e p365]*

337. Ans. (c) Five or more follicles in the upper tarsal conjunctiva *[Ref. National Health Programs of India by Dr. J. Kishore, 7/e p368, 8/e p429]*

338. Ans. (d) 10% *[Ref. Park 23/e p309]*

- *Indication of mass treatment in Trachoma:* > 10 % prevalence of severe and moderate Trachoma in children < 10yrs of age [NEW GUIDELINES–WHO]

339. Ans. (d) Orissa *[Ref. Rapid Assessment of Trachoma in India-A Report, NPCB, DGHS, MOHFW, India 2006, p13]*

- Prevalence rate of active trachoma infection in India 0-14 years (1986-89):
  - *Punjab:* 21.8%

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- *Haryana:* 15%
- *Rajasthan:* 17.1%
- *UP:* 11.7%
- *Orissa:* 10.2%

340. Ans. (d) 10% *[Ref. WHO Trachoma Control: A guide for programme managers, 2006; p21-22]*

- Current WHO recommendations for antibiotic treatment of trachoma:
  - *District level prevalence is > 10% in 1-9 years old children:* Mass treatment with Azithromycin
  - *District level prevalence is 5-10% in 1-9 years old children:* Targeted treatment with Azithromycin (the identification and treatment of all members of any family in whom one or more members have follicular trachoma)
  - *District level prevalence is < 5% in 1-9 years old children:* Azithromycin distribution may not be necessary

341. Ans. (d) 1-9 years *[Ref. K. Park 23/e p309]*

342. Ans. (a) Azithromycin *[Ref. NPCB Document , Government of India]*

TETANUS

343. Ans. (b) Single dose of tetanus toxoid *[Ref. Park 23/e p312-314]*

- **In the given question,** a person has received complete immunization against tetanus 10 years ago,
- Thus he is in immunity category B
- Now, he presents with a clean wound without any lacerations from an injury sustained 3 hours ago,
- Thus he should now be given single dose of tetanus toxoid

344. Ans. (d) < 0.1 per 1000 LB *[Ref. Park 23/e p311]*

- NNT Elimination (Classification of districts, India is based on 3 parameters: incidence rate, TT-2 or booster coverage and % attended deliveries)

Classification	Rate	TT-2 coverage	Attended deliveries
NNT High Risk	> 1/1000 LB	< 70%	< 50%
NNT Control	< 1/1000 LB	> 70%	>50%
NNT Elimination	< 0.1/1000LB	> 90%	> 75%

- *Herd Immunity in Tetanus:* Does not protect the individual

345. Ans. (d) Injection penicillin to all neonates *[Ref. Park 23/e p310-313]*

346. Ans. (d) Seen commonly in winter and dry climate *[Ref. Park 23/e p310-314]*

Tetanus (especially NNT) hjas a marked seasonal incidence in India: > 50% cases in July-September

347. Ans. (c) Man-to-man transmission *[Ref. Park 23/e p310-314]*

- *Primary course of tetanus immunisation:* 3 doses of DPT at interval of 4-8 weeks starting at 6 weeks age (to be followed by boosters at 18 months, 5-6 years, 10 years and 16 years age)
- *Period of communicability:* NONE (not transmitted from person-to-person)
- *Incubation period:* 06-10 days
- *Reservoir:* Soil and dust (spores survive for years in soil)

348. Ans. (c) Tetanus toxoid complete course *[Ref. Park 23/e p312-313]*

349. Ans. (b) Herd immunity present *[Ref. K. Park 23/e p310-313]*

Review Questions

350. Ans. (d) None *[Ref. Park 23/e p311]*

351. Ans. (b) Toxoid one dose *[Ref. Park 23/e p314]*

352. Ans. (b) > 90% coverage of 3 antenatal visits *[Ref. Park 23/e p313]*

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LEPROSY

353. Ans. (d) MDT is contraindicated during pregnancy *[Ref. Park 23/e p314-329]*

- Operational Classification of Leprosy (according to skin smear positivity) to serve as a basis for Chemotherapy:

	Paucibacillary Leprosy (PBL) BI < 2	**Multibacillary Leprosy (MBL)** BI > 2
Included types	Indeterminate	Polar lepromatous (LL)
	Polar tuberculoid (TT)	Borderline lepromatous (BL)
	Border tuberculoid (BT)	Mid-borderline (BB)
Multidrug therapy (MDT) in NLEP (Drugs)	Rifampicin 600 mg OAMS Dapsone 100 mg daily	Rifampicin 600mg OAMS Dapsone 100mg daily Clofazimine 300 mg OAMS and 50 mg daily
Treatment duration	6 months	12 months
Follow up (after treatment)	Annually for 2 yrs	Annually for 5 yrs

(*BI:* Bacteriological Index; *OAMS:* Once a month supervised)
* MBL cases are most important source of infection
* MDT is safe in pregnancy

Also Remember

- *An infectious case of Leprosy can be rendered non-infectious by treatment with:*
  - Dapsone for 90 days, or
  - Rifampicin for 3 weeks
- *Attack rate of Leprosy among house-hold contacts:* 4.4 - 12%
- *Youngest case of Leprosy in India:* 2 ½ month infant
- Leprosy is often known as a 'Social disease'
  - Is probably the oldest disease known to mankind
- *Mode of transmission of Leprosy:*
  - Droplet infection
  - Contact transmission (Direct skin to skin or indirect with soil/fomites)
  - *Other routes:*
    - Breast milk from lepromatous mothers
    - Insect vectors
    - Tattooing needles
- *Diagnosis of leprosy under NLEP*: It is currently based on clinical grounds
  - *PBL:* 1 – 5 skin lesions
  - *MBL:* > 5 skin lesions
- *'Case taking' in Leprosy:* A set pattern of clinical examination to be followed for a patient for the presence of Leprosy. It comprises of:
  - Interrogation (biodata, family history, history of contact, previous history of treatment, symptoms)
  - *Physical examination:*
    - Thorough inspection of Body surface
    - Palpation of commonly involved peripheral and cutaneous nerves (Ulnar nerve - MC involved, Greater auricular nerve, lateral popliteal nerve, dorsal branch of Radial nerve)
    - Testing for loss of sensation and paresis/ paralysis of muscles of hand and feet.

354. Ans. None of the above *[Ref. Internet, Park 23/e p317-318]*

- *Mode of transmission of Leprosy:*
  - Droplet Infection (Aerosols)
  - Contact Transmission (infectious patient and healthy susceptible)
  - Direct contact (skin to skin)
  - Indirect contact (soil, fomites, clothes and linen)

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- Breast milk from lepromatous mothers, transplacental
- Insect vectors
- Tattoo needles

Also Refer to Anexure 4

355. Ans. (a) 1 per 10,000 *[Ref. National Health Programs of India by Dr. J. Kishore, 7/e p215]*

- *Level of Leprosy for declaring it as a Public Health Problem:* >1/10,000
- *Elimination Level of Leprosy:* <1/10,000 (adopted as a resolution by WHO in 1991, to eliminate leprosy as a public health problem by year 2000)
- *Goal for Leprosy under National Health Policy (NHP) 2002:* Elimination of Leprosy by 2005
- India eliminated Leprosy in December 2005 (India has so far eliminated 4 diseases, namely, Guineaworm – 2000, Leprosy – 2005, Yaws – 2006 – and NNT 2015)
- *As on 2009, in India:*
  - *Prevalence:* 0.72 per 10,000 [0.69 per 10000 in 2011]
  - Child proportion among new cases detected: 10.1%
- *Elimination level for Neonatal tetanus:*
  - Rate < 0.1 per 1000 live births
  - TT2 coverage > 90%
  - Attended deliveries > 75%
- *Elimination level for Tuberculosis (WHO and STOP TB Strategy):* <1 case per million population (to eliminate TB as a public health problem)
- *Criteria for tracking progress towards IDD elimination:*

Indicator	Goal
• Proportion with enlarged thyroid (age 6 – 12 years)	< 5 %
• Urinary Iodine Excretion below 100 mcg/litre	< 50 %
• Urinary Iodine Excretion below 50 mcg/litre	< 20 %
• Proportion of houses consuming adequately iodised salt	> 90 %

356. Ans. (b) Prognosis *[Ref. Park 23/e p320]*

- *Uses of Lepromin test:*
  - Evaluation of CMI status of patients
  - Aid to confirm the classification of Leprosy
  - Estimation of prognosis of cases

Also Refer to Theory

Also Remember

- Tests of immunity/susceptibility:
  - *Schick Test:* Diphtheria
  - *Mantoux Test:* Tuberculosis
  - *Leishmanin (Montenegro) Test:* Leishmaniasis (Kala Azar)

357. Ans. (b) It is a diagnostic test *[Ref. Park 23/e p320]*

358. Ans. (a) Stop antileprosy treatment *[Ref. Internet; WHO Website, Park 21/e p299, Park 22/e p298]*

- *According to WHO treatment guidelines for Leprosy:*
  - All MB (multibacillary) patients who have completed 12 or more doses of WHO MDT for multibacillary leprosy 'should be regarded as cured' and removed from the registers
  - However, as usual, all patients should be educated about the signs/symptoms of reactions and relapse and asked to report immediately to the nearest health centre when such problems arise
- *It is not necessary to give MDT to PB patients until clinical inactivity:*
  - Clinical activity in PB leprosy does not necessarily imply direct correlation with bacterial multiplication
  - *In a large proportion of patients it is not possible to achieve clinical inactivity in six months even though all the organisms are killed:* Lesions become inactive gradually over a period of one to two years after the treatment has been discontinued

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359. Ans. (a) Diagnosis *[Ref. Park 23/e p320]*

360. Ans. (c) A defaulter is defined as a patient who has not taken treatment for 6 months or more *[Ref. National Health Programs of India by Dr. J. Kishore, 8/e p362, Park 23/e p322]*

Also Remember

- *'Leprosy is not amenable to eradication' as it has:*
  - Long and variable incubation period
  - Disputed modes of transmission
  - Presence of sub-clinical cases and our inability to detect them
  - Complicated spectrum of disease manifestations
  - Failure of cell mediated immunity in lepromatous cases
  - Bacterial resistance and persistence in the human body
  - Absence of a vaccine
  - Social and cultural taboos leading to concealment of disease
  - Discovery of extra-human reservoir
- *Definitions in Revised National Tuberculosis Control Programme (RNTCP):*
  - *New case:* Never taken treatment or took treatment less than 4 weeks
  - *Cured:* Follow up smears negative on 2 separate occasions including those at the end of treatment
  - *Relapse:* Returns sputum smear positive (ss+ve) after being declared cured
  - *Failure:* Remains or becomes ss+ve at or after 5 months of treatment
  - *Defaulter:* Who misses treatment for a continuous period of 2 months or more

361. Ans. (d) FLA-ABS Test *[Ref. Park 23/e p321]*

Also Remember

- **LEPROMIN TEST:**
  - Is not a diagnostic test: It can yield false positive or false negative (esp. in lepromatous and near lepromatous cases)
  - Is a useful tool for evaluation of CMI status
  - Is widely used to aid classification of the disease
  - Is of great value in estimating the prognosis in Leprosy: Test is strongly positive in typical tuberculoid (TT) cases.
  - Typical lepromatous (LL) cases are lepromin negative indicating a failure of CMI
    1. Lepromin negative individuals are at a higher risk of developing Progressive Multibacillary Leprosy (MBL)
    2. Lepromin positive individuals either escape the clinical disease (the majority) or develop Paucibacillary Leprosy (PBL-the minority)
- **LTT and LMIT CMI Tests:**
  - Useful to detect sub-clinical infection
  - *Disadvantage*: cannot be applied on a mass scale in field conditions

362. Ans. (d) In those with lepromatous leprosy *[Ref. Park 23/e p324]*

363. Ans. (a) Prevalence decreasing in past decade; (d) Highly communicable *[Ref. Park 23/e p315-316]*

364. Ans. (d) Insect can transmit the disease *[Ref. Park 23/e p316-317]*

365. Ans. (b) It is a diagnostic test *[Ref. Park 23/e p320]*

366. Ans. (b) < 1 per 10000 *[Ref. K. Park 22/e p288]*

367. Ans. (d) Long incubation period [SINGLE BEST ANSWER] *[Ref. K. Park 22/e p291]*

368. Ans. (b) 0.01% *[Ref. K. Park 23/e p315]*

369. Ans. (d) 0.69 *[Ref. K. Park 23/e p316]*

370. Ans. (c) 12–15 days *[Ref. K. Park 22/e p290]*

371. Ans. (b) Lepromatous leprosy *[Ref. K. Park 23/e p324]*

372. Ans. (a) Leprosy *[Ref. K. Park 23/e p322]*

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373. Ans. (c) Clinical, bacteriological, Immunological, histological classification *[Ref. K Park 23/e p318-319]*

Classifications of Leprosy

Ridley Jopling classification	Indian classification	Madrid classification
TT (Tuberculoid)	Indeterminate	Indeterminate
BT (Borderline Tuberculoid)	Tuberculoid	Tuberculoid
BB (Borderline Borderline)	Borderline	Borderline
BL (Borderline Lepromatous)	Lepromatous	Lepromatous
LL (Lepromatous Leprosy)	Pure Neuritic	

- Ridley Jopling classification is based on Immuno-histological scale

374. Ans. (d) Diagnosis of leprosy *[Ref. K. Park 23/e p320]*

375. Ans. (a) Clofazimine included in treatment regimen; (c) Grenz zone in Lepromatous spectrum; (e) MBL recommended treatment for 12 months duration *[Ref. Park 23/e p314-329]*

376. (a) 3.5 *[Ref. Park, 23/e p319]*

RIDLEY'S LOGARITHMIC SCALE FOR BACTERIAL INDEX

- *Bacterial/ Bacteriological) index (BI)*: Density of bacilli in smears, including both living and dead bacilli
- *Ridley's logarithmic scale*: Based on the number of bacilli seen in an average High Power microscopic field, using an oil-immersion objective (1/12 in or 2 mm)
- *When several smears are taken*: Mean index is calculated

Score	Description
6+	Many clumps of bacilli in an average field (over 1000)
5+	100-1000 bacilli in an average field
4+	10-100 bacilli in an average field
3+	1-10 bacilli in 10 fields
2+	1-10 bacilli in 10 fields
1+	1-10 bacilli in 100 fields

In the given question, Two samples have 10 bacilli in 100 hpf (each 1+ score), and Tw samples with >1000 bacilli in average filed (each 6+ score)

$$BI = \frac{1+1+6+6}{4} = 3.5$$

Review Questions

377. Ans. (c) 21st day *[Ref. Park 23/e p320]*

378. Ans. (b) Droplet *[Ref. Park 23/e p317-318]*

379. Ans. (b) 5 years *[Ref. National Health Programs by Dr. J. Kishore 8/e p356, Park 23/e p326]*

380. Ans. (a) Ulnar N *[Ref. Park 23/e p318]*

381. Ans. (c) Ciprofloxacin *[Ref. Park 23/e p323-324]*

382. Ans. (c) Paucibacillary leprosy bacterial index is less than 2 *[Ref. Park 23/e p318-319]*

383. Ans. (c) 180 days *[Ref. Park 23/e p323-324]*

384. Ans. (b) Prognosis of disease *[Ref. Park 23/e p320]*

385. Ans. (c) 1 or less than one bacillus in each hpf *[Ref. Park 23/e p319]*

386. Ans. (d) Bacteriological index *[Ref. Park 23/e p319]*

387. Ans. (b) It confirms diagnosis of leprosy *[Ref. Micro by Pro. C.P. Baveja 2/e p350, Park 23/e p320]*

388. Ans. (d) Pure neuritic type *[Ref. Park 23/e p318]*

389. Ans. (b) 2 *[Ref. Park 23/e p318-319]*

390. Ans. (d) Prevalence rate of disease *[Ref. Park 23/e p321]*

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391. Ans. (a) 6 month *[Ref. Park 23/e p323-324]*

HIV

392. Ans. (c) Heterosexual, transplacental, homosexual *[Ref. Park 23/e p346-347]*

- *HIV transmission in India:* [2010]

Route of transmission	Percentage of total cases	Efficiency of route
Sexual	87	0.01 – 1%
Blood and blood products	01	> 90%
Sharing needles/ syringes	02	0.3%
Mother to child transmission	05	30%

  - Tamil Nadu in India has the largest number of HIV/AIDS cases; HIV prevalence has crossed 2% mark in Mumbai
  - *Age and Sex distribution of HIV/AIDS in India [2006]:*

Distribution of HIV/AIDS cases	Cumulative cases
Age distribution	
0 – 14 years	5 %
15 – 29 years	32 %
30 – 44 years	56 %
> 45 years	7 %
Sex distribution	
Male	71%
Female	29%

- *Mother to Child Transmission (MTCT) of HIV:*
  - *MTCT in developing countries (India):* 30%
  - *MTCT in developed countries:* 20%
  - *Prevention of MTCT in India:*

Modality	Dose/ type	Reduction in MTCT by	Post-modality MTCT in India
Zidovudine	*Mother:* 300 mg BD from 36 wks POG + 300 mg 3h during delivery *Child :* 6 mg/kg 6h × 6w	66%	10%
Nevirapine	Single oral dose *Mother:* 200 mg at labor onset *Child:* 2mg/kg within 72 hrs of birth	50%	15%
Caesarean section	Elective CS	50%	15%

  - *Risk of HIV transmission with prolonged breast feeding: 12 – 15%*
  - For NEW GUIDELINES on PMTCT, Refer to Theory

393. Ans. (c) Tamil Nadu *[Ref. K. Park 19/e p287]*

394. Ans. (c) 1st December *[Ref. Internet]*

395. Ans. (c) Thailand *[Ref. Internet]*

- First case of HIV reported:
  - *USA:* 1981
  - *Thailand:* 1984
  - *India:* 1986
  - *Sri Lanka:* 1987
  - *Bangladesh:* 1989

396. Ans. (c) Sexual transmission *[Ref. Park 23/e p346-347]*

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397. Ans. (c) 30-44 years *[Ref. K. Park 23/e p345]*
- *HIV afflicted age groups in India:* 30-44 years > 15-29 years > 45+ years > under 15 years

398. Ans. is (d) Oral thrush *[Ref. Park 23/e p347]*

399. Ans. (a); (b); (d); (e) *[Ref. Park 23/e p348]*

400. Ans. (b) Seminal secretions are highly infectious than vaginal secretions; (c) Infectious in window period; (d) Southern Africa have 72% of global burden; (e) Children rarely affected *[Ref. Park 23/e p345-346]*
- *Key facts about Epidemiology of HIV infection:*
  - *Reservoir:* Cases and carriers
  - *Source:* Virus is in greatest concentration in blood, semen and CSF (lower concentrations in tear, saliva, breast milk, urine, cervical and vaginal secretions)
  - Children under 15 years make only 3% of cases
  - *Basic modes of transmission:*
    - Sexual
    - Blood and blood products
    - Needles/ syringes
    - Mother to Child transmission (MTCT)
  - *IP:* Few months to 10 years

401. Ans. (b) Nevirapine *[Ref. K. Park 23/e p435]*

402. Ans. (c) 15-30% *[Ref. K Park 23/e p346]*
HIV transmission in absence of intervention:
- MTCT of HIV in developed countries: 20% (15-25%)
- MTCT transmission of HIV in developing countries: 30% (25-35%)

403. Ans. (c) 72 hours *[Ref. K. Park 23/e p353]*

404. Ans. (a) Extrapulmonary TB; (b) Cryptococcosis; (c) Candidiasis; (e) Kaposi sarcoma *[Ref. K. Park 23/e p347-349]*

405. Ans. (b) Vitamin A supplementation *[Ref. K Park 23/e p335, 446]*
- Vitamin A supplementation has been shown to neither increase nor decrease the risk of MTCT of HIV
- Vitamin A supplementation INCREASE HIV transmission through breast feeding

406. Ans. (c) HIV-C *[Ref. HIV/ AIDS Care and Counselling by ACV Dyk, 4/e p21]*

407. Ans. (d) All of the above *[Ref. K. Park 22/e p318, 322]*

408. Ans. (d) 65% *[Ref. HIV by HJ Makadon 3/e p299]*

409. Ans. (b) 1983 *[Ref. Black Death: AIDS in Africa by S Hunter 1/e p39]*

HIV Discovery

- HIV-1 discovered in 1983
- HIV-2 discovered in 1986
- HIV discovered by:
  - Robert Gallo (USA)
  - Luc Montagnier, Barre Sinnousi (France) – Awarded Nobel Prize

410. Ans. (a) HAART *[Ref. Perinatal and Pediatric HIV/ AIDS by Mamatha, 1/e p344]*
- Women enrolled on HAART (Triple ARV prophylaxis) had a much lower (1%) rate of HIV vertical transmission as compared to Zidovudine lone
- HAART showed similar rates of transmission when Zidovudine monotherapy was combined with single dose of Maternal or neonatal Nevirapine

411. Ans. (d) None of the above *[Ref. WHO, UNAIDS, AIDS MAP]*
- There have only ever been 4 Large Phase III efficacy trials of HIV vaccines in humans
  - *First two were of different versions of AIDSVAX (2003)*: Neither version prevented infection
  - *Third was the STEP trial (2007)*: No effect in humans but actually increase likelihood of infection
  - *Fourth such efficacy trial "RV144 trial" (2009)*: Modestly, and unexpectedly, efficacious, reducing HIV infections in recipients by 31%
- Currently No large phase III efficacy trials are being conducted

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412. Ans. NONE *[Ref. Antiretroviral Therapy Guidelines for HIV-Infected Adults and Adolescents Including Post-exposure Prophylaxis, MOHFW, GOI. p78]*

PEP INITIATION IN NACP

- PEP needs to be started as soon as possible after the exposure and within 72 hours
- In animal studies, initiating PEP within 12, 24 or 36 hours of exposure was more effective than initiating PEP 48 hours or 72 hours following exposure
- PEP is not effective when given more than 72 hours after exposure
- A baseline rapid HIV testing should be done before starting PEP

	HIV+ Asymptomatic	HIV+ Symptomatic	HIV status unknown
Mild exposure	*Consider 2-drug PEP*	Start 2-drug PEP	Usually no PEP/ Consider 2-drug PEP
Moderate exposure	Start 2-drug PEP	Start 3-drug PEP	Usually no PEP/ Consider 2-drug PEP
Severe exposure	Start 3-drug PEP	Start 3-drug PEP	Usually no PEP/ Consider 2-drug PEP

413. Ans. (c) When prevalence in high risk groups is less than 5%, and more than 1% in antenatal women *[Ref. High risk pregnancy by Deshpande, 1/e p79]*

Review Questions

414. Ans. (b) OPV *[Ref. CDC Guidelines]*

415. Ans. (b) Maternofetal transmission is the most common mode of transmission *[Ref. Park 23/e p345-346]*

416. Ans. (c) 1981 *[Ref. Park 23/e p343]*

417. Ans. (b) They consist of DNA dependent DNA polymerase activity *[Ref. Harrison's 17/e p1140]*

418. Ans. (c) Nagaland *[Ref. Park 23/e p344-345]*

419. Ans. (c) Providing treatment to 3 million sufferers by year 2005 *[Ref. Park 20/e p299]*

420. Ans. (a) 3-12 weeks *[Ref. Park 23/e p347]*

421. Ans. (c) Perinatal *[Ref. Park 23/e p346]*

STI'S (OTHER THAN HIV)

422. Ans. (d) Chlamydia trachomatis *[Ref. Park 23/e p332]*

423. Ans. (d) Echinococcus *[Ref. Park 23/e p330-332]*

- Echinococcus is transmitted to humans by ingestion of eggs in dog's faeces.

Also Remember

- *The 1st effective treatment for a STD:* Salvarsan (a treatment for syphilis)
- *Sexually transmitted oral infections:*
  - Common colds
  - Influenza
  - Staphylococcus aureus
  - E. coli
  - Candida albicans
- *Echinococcus granulosus:*
  - Also known as 'Dog Tape Worm'
  - Dog – sheep cycle with man as intermediate dead end host
    - *Definitive host:* Dog
    - *Intermediate host:* Sheep
  - *Infective stage:* Metacystode larva
  - *Drug of choice:* Mebendazole
  - *Casoni's test:* Immediate hypersensitivity skin test

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424. Ans. (d) Chlamydia psittaci *[Ref. Park 23/e p332]*

Also Remember

- *MC STI globally:* Trichomoniasis
- *Age group with highest risk of STI incidence:* 20-24 yrs > 25-29 yrs > 15-19yrs
- *Usual methods of case detection in a STD control programme:*
  - *Screening:*
  - *Contact tracing:* Sexual partners of diagnosed patients are identified, located, investigated and treated
    - Is one of the best methods of controlling the spread of infection
    - Is relatively expensive (in low prevalence)
    - Key to success is patient himself (who must disclose all sexual contacts voluntarily)
  - *Cluster testing:* Screening of all persons of either sex, who move in the same socio-sexual environment of the patient
    - It almost doubles the number of cases found
    - *Epidemiological treatment or contact treatment:* Administration of full therapeutic dose of treatment to persons recently exposed to STD, while awaiting the results of laboratory tests
  - It must be combined with venereological examination and tracing of contacts revealed by that examination
- *Starting point of control of STD's:* Establishment of STD clinics

425. Ans. (c) A-II, B-III, C-I *[Ref. Park 23/e p341-343]*

ENDEMIC TREPONEMATOSES:

Treponemal Disease	Causative agent	Mode of transmission	Treatment of choice
Pinta	Treponema carateum	Non venereal (direct contact with infectious lesions)	Benzathine Penicillin G
Yaws	Treponema pertunae	Non venereal (direct contact with secretions from infectious lesions, fomites, insect vectors)	
Endemic syphilis	Treponema pallidum	Non venereal	
Syphilis	Treponema pallidum	Venereal	

426. Ans. (c) Neisseria gonorrhoeae and Chlamydia trachomatis *[Ref. National Health Programs of India by Dr. J. Kishore, 8/e p249, Park 23/e p332-333]*

427. Ans. (c) Chancroid, Chancre and Herpes genitalis *[Ref. National Health Programs of India by Dr. J. Kishore, 9/e p261-262]*

428. Ans. (a) Syphilis 10-90 days; (b) LGV 3-10 days; (c) Donovanosis 3-20 days *[Ref. K. Park 21/e p305, Park 23/e p333-338]*

429. Ans. (a) Metronidazole, Azithromycin, Fluconazole *[Ref. K. Park 23/e p334]*

430. Ans. (d) Notification *[Ref. K. Park 23/e p339]*

431. Ans. (d) Permethrin *[Ref. Drugs in Pregnancy and Lactation by Briggs & Freeman, 8/e p1447]*

Review Questions

432. Ans. (a) STD *[Ref. Park 23/e p339]*

433. Ans. (d) Sarcoptes scabiei *[Ref. Park 23/e p781-782]*

434. Ans. (a) Less than 7 days *[Ref. Park 23/e p332]*

435. Ans. (a) 9-90 days *[Ref. Park 23/e p332]*

436. Ans. (d) Cluster testing *[Ref. Park 23/e p339]*

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OTHER COMMUNICABLE DISEASES

437. Ans. (c) HIV *[Ref. Park 23/e p276]*

Also Remember

- *Classification of Zoonoses based upon life cycle of infecting organism:*
  - *Direct zoonoses:* Transmitted from infected to susceptible vertebrate host by direct contact/ fomite/ vector. *Examples:* Rabies, Brucellosis, Trichinosis
  - *Cyclo-zoonoses:* Involve more than one vertebrate species. Examples: Taeniasis, Echinococcosis
  - *Meta-zoonoses:* Transmitted biologically by invertebrate vectors. Examples: Plague, Schistosomiasis, Arboviral infections.
  - *Sapro-zoonoses:* Involves non-animal developmental site or reservoir. Examples: Mycoses, Larva migrans
- *Reverse Zoonoses:* Is synonymous with Zooanthroponoses
- *Epizootic:* Outbreak (epidemic) of a disease in animal population. Examples: Anthrax, Brucellosis, Influenza, Rabies, Rift Valley Fever, Q fever, Japanese encephalitis, Equine encephalitis
- *Enzootic:* Endemic of disease occurring in animals. Examples: Anthrax, Rabies, Brucellosis, Bovine TB, Endemic typhus, Tick typhus
- *Epornithic:* Outbreak (epidemic) of a disease in bird population. Example: Japanese encephalitis.

438. Ans. (a) Spread by sexual transmission *[Ref. Park 23/e p341]*

439. Ans. (b) Leprosy *[Ref. Park 23/e p318-319]*

440. Ans. (c) Toxins can be destroyed by boiling for 30 minutes *[Ref. Park 23/e p238-239]*

441. Ans. (d) Measles *[Ref. Park 21/e p137, Park 22/e p138]*

442. Ans. (b) Tuberculosis *[Ref. Park 23/e p96]*

- CARRIER: An infected person or animal that harbours a specific infectious agent 'in the absence of discernible clinical disease' and serves as a potential source of infection to others
- *Characteristics of a carrier*:
  - Disease agent present in body
  - Absence of recognizable signs and symptoms of disease
  - Shedding disease agent (thus a source of infection)
- *Incubatory carriers:* Shed infectious agent during the incubation period of the disease (esp. during last few days of IP). *For example:* Measles, Mumps, Polio, Pertussis, Influenza, Diphtheria, Hepatitis B, HIV

Also Remember

LATENT TUBERCULOSIS (LATENT TB, LTBI):

- Latent tuberculosis is where a patient is infected with Mycobacterium tuberculosis, but does not have active tuberculosis disease.
  - Latent TB are NOT INFECTIOUS
  - Main risk: 10% will go on to develop active TB at a later life
- *Tests used to identify patients with latent TB:*
  - Tuberculin skin tests (Montaux test, Heaf test, Tine test)
  - a-interferon tests
- *To give treatment for latent TB to someone with active TB is a serious error:* TB will not be adequately treated and there is a serious risk of developing drug-resistant strains of TB
- *Several treatment regimens in use:*
  - 9 months Isoniazid
  - 6 months Isoniazid
  - 4 months Rifampicin
  - 3 months Isoniazid + Rifampicin
  - 2 months Rifampicin + Pyrizinamide.

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443. Ans. (a) Measles *[Ref. Park 23/e p96]*

- *Chronic carriers:* A carrier who excretes bacilli for indefinite periods of time
  - Typhoid
  - Hepatitis B
  - Malaria
  - Dysentery
  - Cerebrospinal meningitis
  - Gonorrhoea
- There are no carriers in Measles

444. Ans. (c) Person to person transmission *[Ref. Park 23/e p290-291]*

- *Modes of transmission of Brucellosis:*
  - *Contact infection:* direct contact with infected tissues, blood, urine, vaginal discharge, aborted fetuses and ESPECIALLY placenta
  - *Food-borne infections:* raw milk/dairy products, fresh raw vegetables, water
  - *Air-borne infection:* aerosol

445. Ans. (b) Yellow fever *[Ref. Park 23/e p282]*

- *There has been NO CASE of YF in India till date:*
  - *India is a 'YF receptive' area:* Population is unvaccinated and susceptible to YF. Vector Aedes aegypti is also found in abundance. Common monkey of India (Macacus spp) is also susceptible
  - *Missing link in chain of transmission of YF in India:* YF Virus
  - If even one case of YF now occurs in India
    - It will be declared an EPIDEMIC (since normal expectancy is zero)
    - It will be an EXOTIC disease

Also Remember

CRIMEAN CONGO FEVER (CCF)

- *Type of disease:* Zoonosis of domestic/wild animals which may affect human beings
- *Causative agent:* Nairovirus (Bunyavirus)
- *Vector:* Hyalomma ticks (Hard ticks)
- *Incubation period:* 1-13 days (Median 5-6 days)
- *Case fatality rate:* 30%
- *Drug of choice:* Ribavrin
- *Situation in India:* Exotic-Epidemic in India (Gujarat, December 2010)

446. Ans. (c) Pertussis *[Ref. Park 23/e p165]*

- The merit of hyperimmune globulin in pertussis prophylaxis has yet to be established. So far there is no evidence of its efficacy in well-controlled trials
- Post exposure prophylaxis of:
  - *H. influenza B:* Rifampicin × 4 days
  - *Hepatitis A:* Human normal Immunoglobulin
  - *Hepatitis B:* Human specific Immunoglobulin
  - *Meningococcal meningitis:* Rifampicin 600 mg BD × 2 days OR Meningococcal vaccine
  - *Rabies:* Human normal Immunoglobulin + Vaccine
  - *Tetanus:* Human normal Immunoglobulin + Vaccine
  - *Measles:* Vaccine within 3 days

Also Remember

- *Types of immunoglobulins:*
  - *IgG:* comprises 85% of total serum immunoglobulins, largely extravascular, 'only class of immunoglobulins to cross placenta'
  - *IgM:* comprises 10% of total serum immunoglobulins, 'indicative of recent infection', has high agglutinating and complement-fixating ability
  - *IgA:* comprises 15% of total serum immunoglobulins, predominantly found in secretions, 'primary defence mechanism at mucous membranes'
  - *IgD:* exact function not known
  - *IgE:* concentrated in submucous tissues, 'responsible for immediate allergic anaphylaxis reaction'

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- *Preparations of immunoglobulins:*

	Human normal Ig's	Human specific Ig's
Source	Antibody-rich fraction obtained from a pool of > 1000 donors	Plasma of recovered patients or immunized individuals 5 times antibody potential of standard preparation
Composition	> 90% IgG; less IgA	
Examples	Hepatitis A Measles Mumps Rabies Tetanus	Hepatitis B Varicella Diphtheria

447. Ans. (a) Cough due to Bordetella pertussis *[Ref. Park 23/e p163]*

Also Remember

- *Hundred day cough:* Pertussis (Whooping cough)
- *5 day fever:* Trench fever
- *8th day disease:* Tetanus
- *Black sickness:* Kala azar
- *Black death:* Plague
- *Cerebrospinal fever:* Meningococcal meningitis
- *Breakbone fever:* Dengue
- *Koch's phenomenon:* Tuberculosis
- *Hansen's disease:* Leprosy
- *Break-bone fever:* Dengue
- *Slim disease:* AIDS
- *First disease/ Rubeolla:* Measles
- *Second disease:* Scarlet fever
- *Third disease/ German Measles:* Rubella
- *Fourth disease:* Duke's disease
- *Fifth disease:* Erythema infectiosum (Parvovirus)
- *Sixth disease/ Baby Measles/ 3-day fever:* Exanthem subitum/ Roseola infantum
- *Barometer of Social Welfare (India):* Tuberculosis
- *Father of Public Health:* Cholera
- *River Blindness:* Onchocerciasis

448. Ans. (a) Leprosy *[Ref. Park 23/e p314]*

449. Ans. (d) HIV/AIDS *[Ref. Park 20/e p299, Park 22/e p298]*

- 3 BY 5 INITIATIVE**:** Launched by WHO and UNAIDS on 1st Dec 2003
  - *Target:* To provide antiretroviral treatment (ART) to 3 million people living with HIV/AIDS (PLHA) in developing countries by end of 2005

Also Remember

- *SAFE strategy:* Surgery, Antibiotic use, Facial cleanliness, Environmental sanitation is for prevention and control of Trachoma
- *Catch up – Keep up – Follow up strategy:* WHO Measles elimination strategy comprises a 3-Part Vaccination strategy:
  - *Catch up:* One time nationwide, vaccination campaign targeting all children 9 months to 14 years of age, irrespective of history of Measles disease or vaccination status
  - *Keep up:* Routine services aimed at vaccinating more than 95% of each successive birth cohort
  - *Follow up:* Subsequent nationwide vaccination campaigns conducted every 2 – 4 years targeting usually all children born after the catch-up campaign.

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- *WHO Intensive PULSE strategy:* Is for prevention and control of Poliomyelitis
- *Roll Back Malaria:* Launched by WHO, UNICEF, UNDP and World Bank in 1998
  - Strengthen health system
  - Ensure proper and expanded use of insecticide treated bed nets (ITBN)
  - Ensure adequate access to basic healthcare and training of healthcare workers
  - Encourage simpler and effective means of administering medicines
  - Encourage development of more effective drugs and vaccines

450. Ans. (b) Cattle *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p511, Park 23/e p302-303]*

- *HOST:* A person or other animal, including birds and arthropods, that affords subsistence or lodgement to an infectious agent under natural (as opposed to experimental) conditions
  - *Primary (definitive) host:* Host in which parasite attains maturity or passes its sexual stage
  - *Secondary (intermediate) host:* Host in which parasite is in larval or asexual stage

		Host	
Disease	**Parasite**	**Primary**	**Secondary**
Malaria	Plasmodium	Anopheles	/Man
Tapeworm	Taenia solium	Man	Pigs
Tapeworm	Taenia saginata	Man	Cattle
Guinea worm	Dracunculus medinensis	Man	Cyclops
Filariasis	Wuchereria bancrofti	Man	Culex
Hydatid Disease	Echinococcus	Dog	Sheep, Cattle, Man
Sleeping sickness	Trypanosomes	Man	Tse tse fly

  - *Obligate host:* Only Host for a Parasite. For example, Man in Measles, Man in Typhoid Fever
  - *Transport host:* A carrier in which the organism remains alive but does not undergo development
  - *Paratenic host:* It is similar to an intermediate host, only that it is not needed for the parasite's development cycle to progress. The difference between a paratenic and reservoir host is that the latter is a primary host, whereas paratenic hosts serve as "dumps" for non-mature stages of a parasite which they can accumulate in high numbers
  - *Dead-end host:* Is an intermediate host that does generally not allow transmission to the definite host, thereby preventing the parasite from completing its development. For example, humans are dead-end hosts for Echinococcus canine tapeworms
- *Tapeworms:*

Tapeworm	**Causative organism**
Pork tapeworm	Taenia solium
Beef tapeworm	Taenia saginata
Fish tapeworm	Diphyllobothrium latum
Dwarf tapeworm (Rat tapeworm)	Hymenolepsis nana

TAENIASIS:

- *Taeniasis are called as 'Cyclozoonoses':* Require more than one vertebrate host species (but no invertebrate host) to complete their developmental cycles
- T.solium and T.saginata may persist for several years in infected humans (small intestines)
- *Mode of transmission:*
  - Ingestion of infective cysticerci in undercooked beef (T.saginata) or pork (T.solium)
  - Ingestion of food, water or vegetables contaminated with eggs
  - Reinfection by reperistalsis of eggs (bowel to stomach)
- IP: 8-14 weeks
- *Most serious risk of T.solium infection:* Cysticercosis
- *Treatment:* Praziquantel and niclosamide
- *DOC Cysticercosis:* Albendazole
- *Most effective method to prevent food borne infections:* cooking of beef and pork

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451. Ans. (c) Falciparum Malaria *[Ref. K. Park 19/e p219]*

- SPf 66: A synthetic 'Lytic Cocktail vaccine' developed for P. Falciparum has been extensively tested
  - Formulated as peptide-alum combination
  - Safe, effective and reduces risk of developing clinics malaria by 30%

452. Ans. (c) Hepatitis E *[Ref. Park 23/e p218-219]*

HEPATITIS E:

- Enterically transmitted hepatitis non-A, non-B [HNANB]
- HEV is essentially a waterborne disease, transmitted through water or food supplies, contaminated by faeces
- Incubation Period: 2 – 9 weeks
- HEV in pregnancy: Fulminant form is common in Hepatitis E infection during Pregnancy (up to 20% cases) with a high case fatality rate (up to 80%)

453. Ans. (a) Measles *[Ref. Park 23/e p146-150]*

454. Ans. (c) Measles *[Ref. Park 23/e p146-150]*

455. Ans. (b) Hookworm eggs per gram faeces *[Ref. Park 21/e p221, Park 22/e p221]*

456. Ans. (a) Trichuris trichura *[Ref. Park 21/e p94, Park 22/e p95]*

- *Obligate Host: Means the only host*
  - Man in Measles
  - Man in Typhoid

457. Ans. (b) Insulin *[Ref. Park 21/e p168, 176, Park 22/e p172, 178]*

- Insulin is given through sub-cutaneous route

458. Ans. (a) Yellow fever; (b) Japanese encephalitis; (e) Dengue *[Ref. Park 23/e p284]*

- *Arboviral infections (arthropod-borne viral infections) in India:*

Group A (Alphaviruses)	Others
Sindbis	Umbre
Chikungunya	Sathuperi
Group B (Flaviviruses)	Chandipura
Dengue	Chittor
KFD	Ganjam
JE	Minnal
West Nile	Venkatapuram
	Dhori
	Kaisodi
	Sandfly fever
	African Horse Sickness
	Vellore

459. Ans. (b) Screening for STD's *[Ref. Park 23/e p339]*

460. Ans. (b) Food poisoning *[Ref. Park 23/e p238-239]*

- *Incubation period of food poisonings:*

Food poisoning	Incubation period
Salmonella	12 – 24 hours
Staphylococcal	1 – 6 hours
Botulism	12 – 36 hours
Cl. perfirengens	6 – 24 hours
B. cereus (emetic form)	1 – 6 hours
B. cereus (diarrhoel form)	12 – 24 hours

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461. Ans. (a) Yellow fever; (c) Japanese Encephalitis *[Ref. Park 23/e p284]*

- *Arboviral infections:* Are 'Arthropod-borne Viral infections'
  - Yellow Fever
  - Japanese Encephalitis
  - Chikungunya Fever
  - Dengue

Also Remember

- Epidemic typhus is a 'Rickettsial disease'
- Kala azar (Visceral Leishmaniasis) is a 'Parasitic Zoonoses'

462. Ans. ALL CHOICES *[Ref. Park 23/e p276]*

463. Ans. (a) HBV; (b) Rabies; (d) Measles; (e) Tetanus *[Ref. Park 21/e p139, 196, 255, 286, Park 22/e p141, 197, 285]*

- *Diseases transmitted by needle stick injury:*

– HIV	– Diphtheria
– HBV	– Ebola virus
– HCV	– Herpes simplex
– Malaria	– Mycobacterium caviae
– Syphilis	– RMSF
– Leptospirosis	– Tuberculosis
– Blastomycosis	– Varicella zoster
– Brucellosis	
– Cryptococcosi	

464. Ans. (a) Chikungunya *[Ref. Park 23/e p289]*

465. Ans. (a) Measles; (b) Diarrhoea *[Ref. Park 23/e p146-150]*

- *All cases of Measles should be treated with Vitamin A:* as many children develop acute deficiency of Vitamin A (Xerophthalmia) which may lead to Keratomalacia and blindness from corneal scarring
- *Diarrhoea is associated with Vitamin A deficiency too*

466. Ans. (b) Influenza-A *[Ref. Park 23/e p153]*

467. Ans. (a) Rabies; (b) Japanese encephalitis *[Ref. Park 23/e p276, 284]*

468. Ans. (a) Epidemic typhus; (b) Japanese encephalitis; (e) KFD *[Ref. Park 23/e p97-98]*

469. Ans. (b) Varicella; (d) Parvovirus *[Ref. Park 23/e p97]*

- *Vertical transmission of diseases:*

Disease	Most common time of transmission
Varicella	I trimester
Rubella	I trimester
Parvovirus	II trimester
Hepatitis B	III trimester
Toxoplasmosis	III trimester
Syphilis	III trimester
CMV	Any trimester
HIV	During delivery
Hepatitis C	During delivery

470. Ans. (c) Q fever *[Ref. Park 23/e p777]*

Refer to Theory

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471. Ans. (b) Overhead tanks severe as breeding sites *[Ref. Park 23/e p284-286]*
- Culx tritaeniorhynchus, C. vishnuii, C gelidus bread in
- Irrigated rice fields (most important)
- Shallow ditches
- Pools

472. Ans. (c) Scabies *[Ref. K. Park 23/e p270, 242, 616, 780]*
- *Lymphatic filariasis:* DEC OR 'DEC + Albendazole/Ivermectin'
- *Vitamin A deficiency:* Single massive dose of Vitamin A (200,000 IU) to preschool children (aged 1-6 years) every 6 months
- *Worm infestation:* Periodic de-worming of Ascariasis (Roundworm) may be undertaken every 2-3 months
  - Undertaken where parasites & PEM highly prevalent
  - ONLY reduces worm load (DOESNOT interrupt transmission)
- *Scabies:* All family members (NOT community) must be treated simultaneously

473. Ans. (c) Vertical transmission *[Ref. Park 23/e p241]*
- *Modes of transmission of Amoebiasis:*
  - Faecal-oral
  - Sexual (Oro-rectal in homosexuals)
  - Vectors (Flies, Cockroaches, rodents)

474. Ans. (d) Yellow Fever *[Ref. Park 23/e p282]*
- Although Yellow fever has never been reported from Asia, the region is at risk because conditions required for transmission are present.

475. Ans. (c) Measles *[Ref. Park 23/e p146-150]*

476. Ans. (d) Later stages involve heart and nerves *[Ref. K. Park 23/e p341]*

477. Ans. (a) Cholera *[Ref. K. Park 23/e p233]*

478. Ans. (c) Whooping cough *[Ref. K. Park 23/e p163]*
- Infants are susceptible to Pertussis infection from birth because maternal antibody does not appear to give them protection.

479. Ans. ALL CHOICES *[Ref. K. Park 23/e p290-291]*

480. Ans. (a) Chikungunya fever; (b) West Nile fever; (c) JE; (d) Sandfly fever *[Ref. K. Park 23/e p284]*

481. Ans. (c) Japanese encephalitis *[Ref. K. Park 23/e p771]*

482. Ans. (c) Pertussis *[Ref. K. Park 23/e p163]*

483. Ans. (a) Scabies *[Ref. K. Park 23/e p242, 270, 616, 780]*

484. Ans. (a) Leptospirosis *[Ref. K. Park 23/e p291-292]*

485. Ans. (a) Cholera *[Ref. K. Park 23/e p233]*

486. Ans. (d) Molluscum contagiosum *[Ref. Clinical Paediatric Dermatology by DM Thappa, 1/e p8]*

487. Ans. (a) Hydatid cyst *[Ref. K. Park 23/e p303]*

488. Ans. (c) Measles *[Ref. K. Park 23/e p146-150]*

489. Ans. (a) Plague; (c) Rabies; (d) Leishmaniasis *[Ref. K. Park 23/e p276, 292, 304]*

490. Ans. (a) TB *[Ref. Multiple sources]*

491. Ans. (b) Hepatitis C *[Ref. K. Park 23/e p217]*

492. Ans. (a) Gammexene; (b) Crotamiton; (c) 5% Permethrin; (e) Sulphur ointment *[Ref. K. Park 23/e p781-782]*

493. Ans. (c) Rabies *[Ref. K. Park 23/e p276]*

494. Ans. (b) Doxycycline *[Ref. Bioterrorism and Infectious Agents by IW Fong & Ken Alibek, 1/e p25]*

495. Ans. (d) German measles – 7 days after onset of rash *[Ref. K. Park 23/e p120]*

496. Ans. (b) Tick *[Ref. Lyme Disease by K Donnelley, 1/e p12]*

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497. **Ans. (a) It is a Zoonosis; (c) Transmission occurs through direct skin contact; (d) Drug of choice is Penicillin; (e) Is a Spirochaetal disease** *[Ref. K. Park 23/e p291-292]*

498. **Ans. (d) Leishmaniasis** *[Ref. K. Park 23/e p291-299]*

499. **Ans. (a) Typhoid** *[Ref. K. Park 23/e p234]*

500. **Ans. (c) Gastroenteritis** *[Ref. K. Park 23/e p221]*

501. **Ans. (a) Influenza** *[Ref. K. Park 23/e p94]*

502. **Ans. (d) Borellia hermsii** *[Ref. Principles and Practices of Paediatric Infectious Diseases, 4/e p959]*

503. **Ans. (a) KFD; (b) Dengue fever; (c) Crimean Congo fever; (e) Hanta fever**

504. **Ans. (b) Dengue fever** *[Ref. Emerging Biological Threats: A Reference Guide by JR Callahan, 1/e p63]*
    - Saddleback fever: Two peaks of fever separated by an afebrile period in-between
    - Seen in: Dengue, Trench fever, Bartonellosis, Chikungunya, Colaradotick fever

505. **Ans. (c) Measles** *[Ref. Park, 23/e, p125]*

506. **Ans. (a) Rocky mountain spotted fever** *[Ref. Park 23/e p299]*

507. **Ans. (a) Hepatitis A** *[Ref. Park, 23/e, p210]*

508. **Ans. (a) Common in veterinarians; (b) Seasonal pattern; (c) Common in butchers; (d) Cutaneous form most common** *[Ref. Anthrax by Koehler, 1/e p9]*

509. **Ans. (c) Incubation period is less than 48 hours; (e) Oseltamivir is quite effective in treatment** *[Ref. Ebola Virus InfoPage, WHO International Website]*

510. **Ans. (a) Plague; (b) Rabies; (c) Anthrax; (e) Brucellosis** *[Ref. Park 23/e p93]*

511. **Ans. (a) Influenza; (d) Yersinia; (e) Swine flu** *[Ref. Park 23/e p154, 156, 292]*

512. **Ans. (a) Plague; (c) Schistosomiasis; (e) Yellow fever** *[Ref. Park 23/e p276]*

513. **Ans. (b) Shigella flexneri** *[Ref. Foodborne and Waterborne Bacterial Pathogens by Faruque, 1/e p91]*

514. **Ans. (b) Body fluids** *[Ref. Park 23/e p356]*

515. **Ans. (c) 1 and 4** *[Ref. Park 23/e p146, 234]*

Review Questions

516. **Ans. (d) Fever common** *[Ref. Park 23/e p238]*

517. **Ans. (a) Rabies** *[Ref. Park 23/e p276]*

518. **Ans. (d) Rabies, tetanus** *[Ref. Park 21/e p94, Park 22/e p95]*

519. **Ans. (a) Plague** *[Ref. Internet, Wikipedia]*

520. **Ans. (a) Cholera** *[Ref. Park 23/e p230]*

521. **Ans. (a) Measles** *[Ref. Park 23/e p146-150]*

522. **Ans. (a) Diarrhea** *[Ref. Park 23/e p239]*

523. **Ans. (a) Chickenpox** *[Ref. Park 23/e p143]*

524. **Ans. (d) T. cruzi** *[Ref. Park 23/e p94]*

525. **Ans. (d) Leishmaniasis** *[Ref. Park 21/e p94, Park 22/e p95]*

526. **Ans. (c) Scabies** *[Ref. Park 23/e p94]*

527. **Ans. (b) Cholera** *[Ref. Park 23/e p99, 230]*

528. **Ans. (b) Polio** *[Ref. Park 23/e p205]*

529. **Ans. (c) KFD** *[Ref. Park 23/e p287]*

530. **Ans. (c) Filariasis is transmitted by Aedes mosquito** *[Ref. Park 23/e p 246 , 284, 287, 270]*

531. **Ans. (d) Dracunculosis** *[Ref. Park 23/e p245]*

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532. Ans. (a) Rats *[Ref. Park 23/e p291]*

533. Ans. (a) AIDS *[Ref. Park 23/e p120]*

534. Ans. (a) Guinea worm *[Ref. Park 23/e p245]*

535. Ans. (a) Tularemia; (d) Rocky Mountain spotted fever *[Ref. Park23/e p780-781]*

536. Ans. (a) Dengue; (b) Chikungunya fever *[Ref. Park 23/e p770-771]*

537. Ans. (a) Malaria *[Ref. Park 23/e p768]*

538. Ans. (b) Clostridium difficile *[Ref. Park 23/e p238-239]*

539. Ans. (a) 1-6 hours *[Ref. Park 23/e p238]*

540. Ans. (a) Polio *[Ref. Park 23/e p120]*

541. Ans. (d) Kala-azar *[Ref. Park 23/e p304]*

542. Ans. (a) Teniasis *[Ref. Park 21/e p94, Park 22/e p95]*

543. Ans. (b) Rabies *[Ref. Park 23/e p135]*

544. Ans. (c) Influenza *[Ref. Park 23/e p154]*

545. Ans. (a) Treponema pertenue *[Ref. Park 23/e p341]*

546. Ans. (d) Tuberculosis *[Ref. Park 23/e p198]*

547. Ans. (d) Meta zoonosis *[Ref. Park 23/e p276]*

548. Ans. (b) Malaria *[Ref. Park 23/e p94, 276]*

549. Ans. (a) Tetanus *[Ref. Park 23/e p94, 276]*

550. Ans. (a) Diphtheria *[Ref. Park 23/e p161]*

551. Ans. (c) Secondary attack rate *[Ref. Park 23/e p100]*

EMERGING AND RE-EMERGING INFECTIONS

552. Ans. (b) Effective vaccine with 82% protective efficacy *[Ref. Park 23/e p174]*

- There is no Vaccine against SARS

CORONARY HEART DISEASE

553. Ans. (b); (c) Salt intake less than 20g/day *[Ref. Park 23/e p370]*

- PRUDENT DIET (DIETARY GOALS): Dietary modification is the principal preventive strategy in the prevention of CHD. WHO recommended changes: [GOAL : Cholesterol/HDL Ratio < 3.5]
  - Reduction of fat intake to < 20 – 30 % of total energy intake
  - Consumption of saturated fats < 7 % of total energy intake
  - Reduction in dietary cholesterol to < 100 mg/1000 kcal/day
  - Increase in complex carbohydrate consumption
  - Reduction of salt intake to < 5 gms per day
  - Avoidance of alcohol consumption

Also Remember

CORONARY HEART DISEASE:

- *CHD is our modern epidemic (WHO):* CHD causes 25 – 30% of deaths in most industrialized countries
- *Simplest measure of burden of CHD:* Proportional mortality ratio
- *Case fatality rate of CHD:* Proportion of attacks fatal within 28 days of onset
- According to Ross, Incubation period of CHD may be > 10 years

Contd...

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Contd...

- *Pattern of CHD in India:*
  - Occurs a decade earlier compared with age incidence in developed nations
  - Peak period is 51 – 60 years age
  - Males affected more than females
  - Hypertension and Diabetes mellitus account for > 40% cases
  - Heavy smoking is responsible for a large no. of cases
- *Single most useful test for identifying individuals at high risk of CHD:* Blood pressure
  - Systolic BP better predictor of CHD than Diastolic BP
- *CHD risk preventation:*
  - Cholesterol/HDL ratio < 3.5
  - HDL cholesterol > 30 mg/ dl
- *Alcohol intake as an independent risk factor for CHD:* > 75 grams per day.

554. Ans. is (b) Filters provide a protective effect for CHD *[Ref. Park 23/e p368]*

- *Smoking as a risk factor for CHD:*
  - Modifiable major risk factor
  - 25% of CHD deaths under 165 years age
  - Causes Sudden death from CHD, especially in men < 50 years age
  - Degree of risk of developing CHD is directly related to no. of cigarettes smoked per day
  - Filter cigarettes are probably not protective
  - Synergistic with other risk factors like hypertension and elevated serum cholesterol
  - *Risk of death from CHD decreases on cessation of smoking:*
    1. Risk declines substantially within 1 year of cessation
    2. After 10 – 20 years, it is same as that of non-smokers
  - Those with history of myocardial infarction – risk of fatal occurrence reduced by 50%

Also Remember

- *Mean serum cholesterol level associated with high risk of CHD:* >200 mg/dl
  - *Threshold level:* 220 mg/dl
  - *Most direct association with CHD:* LDL cholesterol
  - *Protective for CHD:* HDL cholesterol (>30 mg/dl)
  - *Clinical goal of CHD prevention:* Cholesterol/HDL ratio <3.5
  - *Better predictors of CHD:* Apolipoprotein A–I and Apolipoprotein B

555. Ans. (c) LDL *[Ref. K. Park 23/e p367-369]*

- Most direct association with CHD: LDL cholesterol

556. Ans. (a) LDL cholesterol less than 100 mg/dL *[Ref. Park 23/e p370]*

557. Ans. (d) NYHA 4 *[Ref. Comprehensive Coronary Care by Jowett & Thompson, 4/e p280]*

New York Heart Association (NYHA) Classification

- *Importance*: Scale used for quantification of degree of functional limitation imposed by Congestive health failure (CHF)

Class	Severity	Physical activity	Description
NYHA I	Mild asymptomatic	No limitation	Comfortable at rest & ordinary exertion
NYHA II	Mild symptomatic	Slight limitation	Comfortable at rest; ordinary exertion cause symptoms
NYHA III*	Moderate	Marked limitation	Comfortable at rest; less than ordinary activity cause symptoms
NYHA IV	Severe	Unable to carryout	Symptoms at rest

(*Class IIIa No dyspnoea at rest; Class IIIb Dyspnoea at rest)

558. Ans. (a) < 3.5 *[Ref. Personal Training by Wade, 1/e p153]*

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Review Questions

559. Ans. (b) Decreasing *[Ref. Park 23/e p367]*

560. Ans. (a) Indian CHD occurs 1 decade later than Western CHD *[Ref. Park 23/e p366-372]*

561. Ans. (b) Mean age of patient is 10-20 years more than that of western *[Ref. Park 23/e p366-372]*

562. Ans. (a) Framingham study *[Ref. Park 23/e p371]*

563. Ans. (a) Personality *[Ref. Park 23/e p367-369]*

HYPERTENSION

564. Ans. (a) Weight reduction; (b) Exercise promotion; (c) Reduction of salt intake; (e) Self care *[Ref. Park 23/e p375-376]*

- *Population strategy for prevention of Hypertension:*
  - Is primary level of prevention
  - Includes:
    - Nutrition (Reduction of salt intake to < 5 grams a day, moderate fat intake, avoidance of alcohol intake, re-sytriction of energy intake as per body needs)
    - Weight reduction (BMI <25)
    - Exercise promotion
    - Behavioural changes (reduction of stress and smoking, doing yoga and meditation)
    - Health education
    - Self care

565. Ans. (d) Obesity *[Ref. K. Park 23/e p375]*

566. Ans. (d) BP of hyoptensive remain hypotensive *[Ref. Park 23/e p374]*

567. Ans. Ans. (a) Dietary approaches to stop hypertension *[Ref. DASH Guide by Chavez, 1/e p1]*

DASH DIET (DIETARY APPROACHES TO STOP HYPERTENSION)

- *Description*: Dietary pattern promoted to prevent and control hypertension
- DASH diet is rich in fruits, vegetables, and low-fat dairy foods with whole grains; includes meat, fish, poultry, nuts, and beans; and is limited in sugar-sweetened foods and beverages, red meat, and added fats
- DASH reduces SBP by 6 mm Hg, DBP by 3 mm Hg in high normal BP
- DASH leads to No changes in body weight
- DASH is adjusted based on daily intake of 1,600-3,100 calories

568. Ans. Ans. (d) Fruits, vegetables, Low fat dairy foods *[Ref. DASH Guide by Chavez, 1/e p1]*

RHEUMATIC FEVER

569. Ans. (b) Mitral regurgitation is the commonest cardiac lesion seen *[Ref. Park 23/e p379]*

Also Remember

- *RF is not a communicable disease:* but it results from a communicable disease (streptococcal pharyngitis)
- *MC cause of Heart disease in 5 – 30 yrs age group (globally):* RF
- *Prevalence of RHD in India:* 5 – 7 per 1000 in 5 – 15 yrs age group
  - RF occurs in 1 – 3% of Streptococcal infection
- *Eradication of Grp A Streptococcus is not possible:* In view of its high carrier rate
- *MC ECG finding in RF:* First degree AV block
- *Best indicator for evaluation of RF control programme:* Prevalence of RHD in 6 – 14 yrs school children
  - Recommended periodicity of surveys: every 5 yrs
  - Recommended sample size: 20,000-30,000
- Except carditis, other major manifestations in RF do not cause permanent residual damage

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570. Ans. (d) In Revised Jones' Criteria, evidence of preceding streptococcal infection is taken for last 21 days *[Ref. Park 23/e p378-381]*

571. Ans. (d) Elevated ESR *[Ref. Park 23/e p380]*

572. Ans. (b) Polyarthralgia *[Ref. K Park 23/e p380]*

573. Ans. (a) Screening of school going children *[Ref. Park 23/e p380-381]*

CANCERS

574. Ans. (c) Breast cancer *[Ref. Cancer Registration in India – 50 Years of Cancer Control Programme in India, MoHFW]*

- Most common cancer among females in India is Breast Cancer in both urban and rural areas *[NEW DATA RELEASED]*

575. Ans. (c) Lung cancer *[Ref. Park 23/e p382]*

- *The total cancer burden (in decreasing order) globally:*
  - Lung cancer
  - Colorectal cancer
  - Breast cancer
  - Stomach cancer

Also Remember

- Among Indian women, cancers of breast and cervix account for nearly 60% of all cancers
- *Beer consumption is associated with:* rectal cancer
- Alcohol contributes to: 3% of all cancer deaths
- *Environmental factors are responsible for:* 80-90% of all humancancers
- Occupational exposures (MC – Skin cancer) account for 1 – 5% of all cancers
- *MC cancer among females in India:* Breast cancer
- Gall bladder cancer has the highest age-adjusted incidence rate among females in Delhi

576. Ans. NONE (Now Lip, Oral cavity cancer) *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p613, Park 23/e p384]* Refer to theory for new data.

577. Ans. (b) Breast cancer *[Ref. Park 23/e p382]*

578. Ans. (c) Penile cancer and cervical cancer following circumcision *[Ref. Park 23/e p385]*

- *Associations of few cancers:*

Association	Cancer associated
Smoking	Lung cancer
Tobacco chewing	Oral cancer
Using hot pot in winter	Kangri cancer
Beer consumption	Rectal cancer
Smoked fish consumption	Stomach cancer
High fat intake	Breast canvcer
Reduced fibre intake	Colo-rectal cancer
Aniline dyes exposure	Bladder cancer

579. Ans. (b) 2 primary doses req for immunization; (e) Recommended for age group 20-40 years *[Ref. Internet Wikipedia]*

- HPV vaccines protect against two HPV types (HPV 16 and 18) that cause 70% of cervical cancers worldwide
- HPV vaccines are recommended for age group 9 – 25 years, who have never been exposed to HPV
- HPV vaccine is a three dose vaccine
- HPV should be refrigerated, NOT frozen

580. Ans. (a) Ca cervix; (b) Ca Breast; (c) Ca Prostate; (e) Ca Colon *[Ref. Park 23/e p386-387]*

- Lung cancer does not satisfy the criteria for suitability of a disease for Lung cancer

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581. Ans. (c) Carcinoma colon *[Ref. CMDT 2014, p1571]*
Refer to Chapter 4

582. Ans. (b) 1 million *[Ref. K. Park 23/e p383]*

583. Ans. (c) Lung cancer *[Ref. K. Park 23/e p382]*

584. Ans. (c) Breast cancer *[Ref. K. Park 22/e p354]*

585. Ans. (c) 90% *[Ref. Park 23/e p385]*

586. Ans. (d) Breast *[Ref. Park 23/e p384]*
- Mortality due to cancers among women in India (2012): Breast (21.5%) > Cervix uteri (20.7%) > Colorectum > Ovary
- Mortality due to cancers among women in World (2012): Breast (14.7%) > Lungs (13.8%) > Colorectum > Cervix-uteri

587. Ans. (b) Oropharyngeal carcinoma *[Ref. Park, 23/e p384]*

CANCERS AMONG MALES IN INDIA
- *Highest Incidence*: Lung (11.3%) = Lip/Oral cavity (11.3%)
- *Mortality*: Lung > Stomach > Lip/Oral cavity
- *5-year prevalence*: Lip/Oral cavity > Prostate > Colorectum > Other pharynx > Stomach > Lung

588. Ans. (c) Unexplained weight gain *[Ref. Park 23/e p386]*

EARLY WARNING SIGNS (DANGER SIGNALS) OF CANCER
- Lump/Hard area in breast
- Change in wart/mole
- Persistive change in digestive/bowel habits
- Persistent cough or hoarseness
- Excessive loss of blood at monthly period OR loss of blood outside usual dates
- Blood loss from any natural orifice
- Swelling or sore not getting better
- Unexplained loss of weight

Review Questions

589. Ans. (b) Self examination *[Ref. Internet]*

590. Ans. (a) Head and neck carcinoma *[Ref. Internet]*

591. Ans. (d) Early marriage *[Ref. Park 23/e p388]*

592. Ans. (d) Single child birth *[Ref. Park 23/e p388]*

OBESITY

593. Ans. (b) 18.5 – 22.99 *[Ref. Internet]*
- *Body Mass Index (Quetelet's Index):*

$$BMI = \frac{\text{Weight (Kg)}}{\text{Height}^2\text{(m)}^2}$$

- *Classification of adults according to BMI:*

Classification	BMI		
	for Global population	for Asian population*	for Indian Population
Underweight	< 18.5	< 18.5	< 18.5
Normal BMI	18.5–24.99	18.5–22.99	18.5–22.99
Overweight	25–29.99	23–26.99	23–24.99
Obesity	> 30.0	> 27.9	> 25.0

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- *Classification of obesity based on BMI:*

Classification	BMI
Pre-obese (overweight)	25.0–29.99
Obesity Grade I	30.0–34.99
Obesity Grade II	35.0–39.99
Obesity Grade III	> 40.0

- *Classification of underweight based on BMI:*

Classification	BMI
Grade I Underweight	17.0–18.49
Grade II Underweight	16.0–16.99
Grade III Underweight	< 16.0

Also Remember

- *Most prevalent form of malnutrition:* Obesity
- *BMI > 40:* Grade III obesity (Morbid obesity)
- *BMI > 50:* Super obesity
- *Women have higher rate of obesity:* Women's BMI increase by 1kg per pregnancy
- *Relationship between alcohol consumption and adiposity:* Positive for men and negative for women
- Corpulence index is a 'height independent' criterion of obesity
- *Cut offs for obesity:*
  - *In epidemiological studies:* + 2SD (standard deviations) from median weight for height
  - *In layman terms:* Body weight in excess of 10% of expected weight
- *NEW GUIDELINES FOR OBESITY IN INDIA (2009):*

Classification	BMI
Normal weight	18.5 – 22.99
Overweight	23.0 – 24.99
Obesity	> 25.0
Require bariatric surgery	> 32.5

  - *Cut-offs for waist circumference:*

Populations		Cut-off for WC
Indian		
Indian	Males	90 cm
	Females	80 cm
Global	Males	102 cm
	Females	88 cm

594. Ans. (b) 30 *[Ref. Park 23/e p399]*

- Body Mass Index (Quetelet's Index):
  In the given question, Weight = 89 Kg and Height = 1.72 m
  Thus, $Wt/Ht^2 = 89/ (1.72)\ 2 = 30$

595. Ans. (d) Anterior abdominal wall *[Ref. Park 23/e p400]*

596. Ans. (d) Corpulence Index *[Ref. Park 23/e p400]*

597. Ans. (c) > 30 *[Ref. Park 23/e p399]*

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598. **Ans. (a) BMI** *[Ref. Park 23/e p399]*
- BMI (Body Mass Index) or Quetelet's Index: although not an accurate measurement of fat accumulation, but is a widely used index of obesity (also is Broca's Index)

599. **Ans. (a) Regular exercise with same amount of food** *[Ref. Park 23/e p400]*

WEIGHT CONTROL MEASURES:
- *Dietary changes:*
  - Reduce proportions of carbohydrates and fats (energy dense foods)
  - Increase fibre consumption
  - Ensure adequate levels of essential nutrients
- Increased physical activity
- *Others:*
  - Drugs
  - Surgical treatment
  - Health education

600. **Ans. (c) > 25** *[Ref. Park 23/e p399]*

601. **Ans. (a) Broca's index; (b) Ponderal index; (c) Quetelet index; (d) Corpulence index** *[Ref. Park 23/e p399-400]*

602. **Ans. (a) 25-29.99** *[Ref. K. Park 23/e p399]*

603. **Ans. (b) 32** *[Ref. K. Park 23/e p399]*

604. **Ans. (b) 30** *[Ref. K. Park 23/e p399]*

605. **Ans. (d) Corpulence index** *[Ref. K. Park 23/e p400]*

606. **Ans. (d) 18.5 to 22.99** *[Ref. K. Park 23/e p399]*

607. **Ans. (c) Ponderal's index** *[Ref. K. Park 23/e p399]*

608. **Ans. (d) Corpulence index** *[Ref. K. Park 23/e p400]*

609. **Ans. (a) Measurement of obesity** *[Ref. K. Park 23/e p400]*

610. **Ans. (b) 0.85** *[Ref. Park 23/e p400; WC & WHR, WHO Consultation 2008]*

WHO CUT-OFF POINTS OF WHR

Indicator	Cut-off points	Risk of metabolic complications
Waist circumference	>94 cm (M); >80 cm (W)	Increased
Waist circumference	>102 cm (M); >88 cm (W)	Substantially increased
Waist–hip ratio	≥0.90 cm (M); ≥0.85 cm (W)	Substantially increased

(M: Men; W: Women)

Review Questions

611. **Ans. (b) 30** *[Ref. Park 23/e p399]*

612. **Ans. (a) Measurement of obesity** *[Ref. Park 23/e p399]*

613. **Ans. (d) Sullivan's index** *[Ref. Park 23/e p399]*

614. **Ans. (c) Quetelet's index** *[Ref. Park 23/e p399]*

615. **Ans. (d) Waist to hip ratio** *[Ref. Park 400]*

616. **Ans. (a)** $\frac{\text{Weight (Kg)}}{(\text{Height})^2 (\text{meters})}$ *[Ref. Park 23/e p399]*

BLINDNESS

617. **Ans. (b) 700** *[Ref. The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India,2002; p29]*

618. **Ans. (a) Cataract** *[Ref. Park 23/e p402]*

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Also Remember

- *MCC of blindness in SEAR:* Cataract (50 – 80%)
- *Low Vision (Visual Acuity < 6/18 – 6/60):* Is an important cause of sub-optimal visual functioning.
  - *Major causes of Low Vision in India:* (are similar to causes of blindness)
    1. Cataract (77%) – MCC of Low Vision in India
    2. Refractive Error (19%)
    3. Central corneal opacity
    4. Pterygium
    5. Peripheral corneal opacity
    6. Other causes

619. Ans. (b) <6/60 in better eye *[Ref. The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 2002; p36]*

- *Legal blindness:* Is defined as visual acuity (vision) of 20/200 (6/60) or less in the better eye with best correction possible
  - In many areas, people with average acuity who nonetheless have a visual field of less than 20 degrees (the norm being 180 degrees) are also classified as being legally blind.

620. Ans. (d) Onchocerciasis *[Ref. National Health Programs of India by Dr. J. Kishore, 7/e p368 and The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 2002; p234-45]*

- *Vision 2020 – The Right To Sight:* A global initiative by WHO and International NGOs to reduce avoidable (preventable and curable) blindness by 2020

Global Vision 2020 (5 diseases)	Indian Vision 2020 (7 diseases)
Cataract	Cataract
Refractive errors and low vision	Refractive errors and low vision
Childhood blindness	Childhood blindness
Trachoma	Trachoma (Focal)
Onchocerciasis	Glaucoma
	Diabetic retinopathy
	Corneal blindness

Also Remember

- India was the 'first country in the world to launch the National Programme for Control of Blindness' in 1976 with the goal of reducing the prevalence of blindness.

621. Ans. (b) Cataract *[Ref. The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 2002; p36]*

Also Remember

- WHO defines Blindness as 'visual acuity of <3/60 in better eye with best possible correction'
- National Programme for Control of Blindness (NPCB), India defines Blindness as 'visual acuity of <6/60 in better eye with best possible correction'
- *American Medical Association definition of blindness:* 'Central visual acuity of 20/200 or less in the better eye with corrective glasses' (or central visual acuity of more than 20/200 if there is a visual field defect in which the peripheral field is contracted to such an extent that the widest diameter of the visual field subtends an angular distance less than 20 degrees in the better eye)
- *Goal for Blindness in National Health Policy (NHP) 2002:* Reduce prevalence of Blindness to 0.5% by 2010
- *International symbol of blindness:* Long white cane.

622. Ans. (a) Jammu and Kashmir *[Ref. The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 02; p34]*

WHO – NPCB SURVEY OF BLINDNESS IN INDIA (1986–89):

- *Prevalence of blindness:* 1.49%
- *Prevalence of one-eyed blindness:* 0.8%
- *Economically blind (Visual acuity <6/60 in better eye) in India:* 11.92 million
- *One eye economically blind (Visual acuity <6/60 in worse eye):* 7.12 million
- *Low vision (<6/18 – 6/60 in better eye):* 28.56 million (MCC: Cataract)

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- *Highest prevalence of blindness:* Jammu and Kashmir (2800/100,000 population)
- *Lowest prevalence of blindness:* Meghalaya (220/100,000 population)
- *Classification of states based on blindness prevalence:*

Category	% prevalence	States
Low	< 1	Delhi, Himachal Pradesh, Punjab, West Bengal, North East States
Moderate	1 – 1.49	Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Kerala, Karnataka
High	1.5 – 1.99	Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh
Very high	> 2	Jammu and Kashmir, Madhya Pradesh, Rajasthan

Also Remember

- India was the first country to launch NPCB (1976)
- *Trends of blindness in India:*

Year of survey	Prevalence of blindness
1971 – 74 (ICMR)	1.38%
1986 – 89 (NPCB)	1.49%
2001 – 02	1.1%
2006 – 07	1.05%
Goal by 2010	0.5%
Goal by 2020	0.3%

Also Remember

- About 80% of blindness is avoidable
- *Legal Blindness:* Visual acuity <6/60 (<20/200) OR Visual field <20° in better eye with best possible correction
- *Work Vision:* <6/60 (Economic Blindness)
- *Walk Vision:* <3/60 (Social Blindness)

623. Ans. (a) Measles; (c) Rubella *[Ref. Park 23/e p146, 150]*

- *Severe Measles:* can lead to acute deficiency of Vitamin A, which may lead to:
  - Keratomalacia
  - Blindness from corneal scarring
- *Congenital Rubella:* may lead to
  - Cataract
  - Glaucoma
  - Retinopathy

624. Ans. (b) Underestimation *[Ref. K. Park 22/e p371]*

Blindness situation in India:

- Estimated prevalence of Blindness in India (Total): 11.2 per 1000 population
- Estimated prevalence of Blindness in India (0-14 years): 0.1 per 1000 population
- Estimated prevalence of Blindness in India (15-49 years): 0.6 per 1000 population
- Estimated prevalence of Blindness in India (50+ years): 77.3 per 1000 population

So if Schools are used where only refractive errors generally constitute blindness (that too very few are actually blind i.e. <6/60) AS COMPARED TO POPULATION (where age-related cataract constitute as major cause of blindness), it would lead to underestimation of prevalence of blindness in the country

625. Ans. (d) 0.75 *[Ref. Disability Guidelines, Office of the Commissioner for Persons with Disabilities p13]*

626. Ans. (b) 19.7% *[Ref. Park 23/e p402]*

627. Ans. (c) Cataract, Refractive error, Glaucoma, Corneal opacity *[Ref. Park 23/e p402]*

CAUSES OF BLINDNESS IN INDIA

- Cataract (62.6%)
- Refractive error (19.7%)
- Other causes: Glaucoma > Posterior segment pathology > Corneal opacity > Surgical complications > Posterior capsular opacification

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Review Questions

628. **Ans. (a) 3/60** *[Ref. Park 23/e p401]*

629. **Ans. (d) 0.7%** *[Ref. Park 23/e p402]*

630. **Ans. (d) Refraction error** *[Ref. Park 23/e p402]*

631. **Ans. (c) Vit. A deficiency** *[Ref. Park 23/e p402]*

MISCELLANEOUS

632. **Ans. (d) Risk factor intervention trials** *[Ref. Park 23/e p371-372]*

WIDELY REPORTED RISK FACTOR INTERVENTION TRIALS:

- Stanford-three-community study:
  - *Aim:* To determine if community health education can reduce the risk of cardiovascular diseases
  - *Results:* Reduction seen 23 – 28%
- *The North Kerelia project:*
  - *Aims:* To reduce cardiovascular risk factor levels and to promote early diagnosis, treatment and rehabilitation of patients
  - *Results:* Reduction seen in CHD deaths in 10 years
- *Multiple risk factor intervention trial (MRFIT):*
  - *Aims:* To reduce cardiovascular risk factor levels (smoking, high BP, hypercholesterolemia)
  - *Results:* Non-significant reduction in reduction seen in CHD deaths in 10 years
  - *Interpretation:* Control group was not properly chosen (changed habits and lifestyle to an extent not anticipated by designers of trial)
- *Oslow diet/ smoking intervention study:*
  - *Aim:* To determine if serum lipids lowering and smoking-cessation would reduce incidence of first attack of CHD in 40-50 yrs males
  - *Results:* Reduction of MI by 47%
  - *Importance:* With this study, primary prevention of CHD entered practical field of preventive medicine in an impressive manner.
- *Lipid Research Clinics study:*
  - *Aim:* To determine if reducing serum cholesterol (using cholestyramine) would prevent CHD events
  - *Results:* 8.5% reduction in total cholesterol, 12.6% reduction in LDL-cholesterol; 24% reduction in CHD and 19% reduction in non-fatal MI

633. **Ans. (a) Cerebral thrombosis** *[Ref. Park 23/e p377-378]*

STROKE (APOPLEXY):

- *WHO definition:* Rapidly developing clinical signs of local (or global) cerebral dysfunction, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin
  - 24 hour threshold EXCLUDES transient ischemic attacks (TIA)
- *WHO definition:* Rapidly developing clinical signs of local (or global) cerebral dysfunction, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin
- *Causes of stroke:*
  - Cerebral thrombosis (MCC of stroke or apoplexy)
  - Cerebral hemorrhage
  - Subarachnoid hemorrhage
  - Cerebral embolism

634. **Ans. (a) Well-defined etiological agent** *[Ref. Park 23/e p362-364]*

- *Gaps in natural history of non-communicable diseases:*
  - Absence of a known agent
  - Multifactorial causation
  - Long latent period
  - Indefinite onset

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Also Remember

- *6 key sets of risk factors for non communicable diseases:*
  - Cigarette use and other forms of smoking
  - Alcohol abuse
  - Failure/ inability to obtain preventive health services
  - Lifestyle changes (dietary patterns, physical activity)
  - Environmental risk factors
  - Stress factors
- *Chronic diseases:* Comprises of all impairments or deviations from normal, which have one or more of the following characteristics:
  - Are permanent
  - Leave residual disability
  - Are caused by non-reversible pathological alteration
  - Require special training of patient for rehabilitation
  - May be expected to require a long period of supervision, observation or care

635. Ans. (b) Hypertension *[Ref. Park 23/e p373]*

- RULE OF HALVES: Hypertension is an 'Iceberg disease'. Only about half of hypertensive subjects in general population of most of the developed countries are aware of condition, only half of those aware of the problem were being treated and only half of those treated were considered adequately treated.

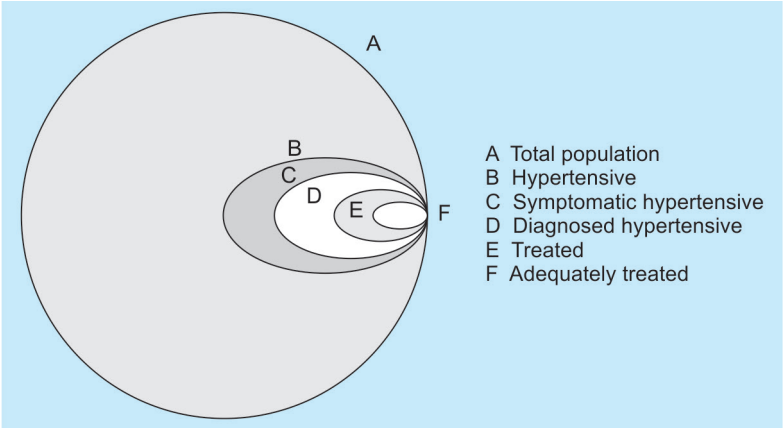

Figure: Rule of Halves

- Hypertension (HT) is the MC cardiovascular disorder
- Single most useful test to identify high risk of CHD: Blood Pressure
- Systolic BP is a better predictor of CHD than diastolic BP
- Prevalence of HT in India (1977-78):

	Males	Females
Urban	59.9 per 1000	69.9 per 1000
Rural	35.5 per 1000	35.9 per 1000

- *Tracking of Blood Pressure:* If BP of individuals were followed up over a period of years from early childhood into adult life, then those having high BP would continue into same 'track' as adults
  - Low BP tends to remain low and high BP tends to become higher as individuals grow older

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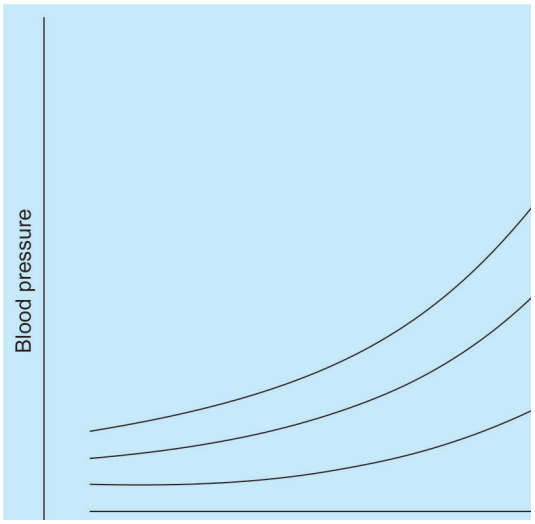

Figure: Tracking of blood pressure

- *Goal of population strategy (Primary prevention) for HT control:* To shift the community distribution of BP towards lower levels or 'biological normality'
- *Recommended salt intake to prevent HT:* < 5 gm per day

636. Ans. (a) Shift the population curve of risk factors by a population based approach *[Ref. K. Park 23/e p364]*

637. Ans. (b) Non-communicable diseases *[Ref. World Health Organisation]*

- *STEP wise approach to surveillance (STEPS):* Is a simple, standardized method by WHO for surveillance
- Is of two types
- STEP wise approach to chronic disease risk factor surveillance
- STEP wise approach to Stroke surveillance
- *Comprises of 3 steps:*

STEPS	CORE	EXPANDED
STEP 1	Tobacco use	Tobacco use
Behavioural measurements	Alcohol consumption	Alcohol consumption
	Diet	Diet
	Physical activity	Physical activity
	History of raisesd BP	History of raised BP
	History of dibetes	History of diabetes
STEP 2	Height and weight	Hip circumference and Heart rate
Physical measurements	Waist BP	
STEP 3	Blood glucose	Triglycerides and HDL choleterol
Biochemical measurement	Blood lipids	

638. Ans. (b) TB. *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p419, 591, 612]*

- *TB in India (National TB Survey, ICMR 1955-58):*
- Rural population suffered as equally as urban population
- Elderly suffered more than young ones
- Mental illness in India
- Prevalence rates are significantly higher in urban areas (Except for epilepsy and hysteria)
- *Bronchitis and Lung Cancer in India:* Is more common in Urban areas.

639. Ans. (b) FBS >125 mg/dl and PPBS >199 mg/dl *[WHO Guidelines]*

WHO GUIDELINES FOR DIAGNOSIS OF DIABETES MELLITUS

- *Fasting plasma glucose level:* > 126 mg/dL (> 7 mmol/L)

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- *2-hour venous plasma glucose in Glucose tolerance test:* > 200 mg/dL (> 11.1 mmol/L)
- *Casual plasma glucose:* > 200 mg/dL (> 11.1 mmol/L)
- *Glycated haemoglobin:* > 6.5%

640. Ans. ALL CHOICES *[Ref. Park 23/e p405-409]*

- *Accidents and injuries in India (in order of decreasing numbers):*
  - Road traffic accidents
  - Work related injuries
  - Burns
  - Violence, suicide
  - Poisoning
  - Drowning

641. Ans. (b) Road traffic accident *[Ref. K. Park 23/e p405]*

642. Ans. (b) Fasting blood sugar *[Ref. Oxford Desk Reference OBG by Arulkumaran, 1/e, p201]*

643. Ans. (a) Cyclic trends *[Ref. Park 23/e p405-409]*

644. Ans. (b) 10.6 per 100,000 population *[Ref. Accidental Deaths and Suicides in India 2014, National Crime Records Bureau, Ministry of Home Affairs, GOI p192]*

SUICIDES IN INDIA

- *Suicide rate in India*: 10.6 per Lac population
- *Highest number of Suicides*: Maharashtra
- *Highest Suicide rate*: Puducherry > Sikkim
- *Lowest Suicide rate*: Nagaland
- *MC cause of Suicides*: Other family problems > Illness
- *MC age group in Suicides*: 18-30 years (Males: Females = 2:1)
- *MC mode of Suicides*: Hanging (> Self-poisoning > Self-immolation > Drowning)

645. Ans. (d) Hanging *[Ref. Accidental Deaths and Suicides in India 2014, National Crime Records Bureau, Ministry of Home Affairs, GOI p207]*

646. Ans. (d) Injury prevention *[Ref. Textbook of Public Health and Community Medicine by Bhalwar, 1/e p1243]*

THE HADDON MATRIX

- *Description*: One of the most successful theoretical approaches to injury prevention, developed by Dr William Haddon in the 1970s
- *Principles of injury prevention based on the Haddon's Matrix*:
  - To reduce exposure to risk
  - To prevent road traffic crashes from occurring
  - To reduce the severity of injury in the event of crash
  - To reduce the consequences of injury through improved post-collision care
- Haddon Matrix divides the timing of the injury event into three phases
  - Pre-injury phase: Goal is to eliminate any energy transfer to the host (Primary prevention)
  - Injury phase: Goal is to eliminate/reduce the amount of energy absorbed by the host once an energy transfer has occurred (Secondary prevention)
  - Post-injury phase: Introduces value criteria to consider when choosing an intervention strategy

Phase	Human Factors	Vector (Vehicles)	Physical environment	Socioeconomic environment
Pre-injury	Alcohol Intoxication	Instability in utility vehicles	Poor visibility of road hazards	Lack of knowledge regarding injury risks
Injury	Low resistance to energy	Sharp or pointed edges/ surfaces	Flammable building materials	Lack of enforcement of safety belt legislation
Post-injury	Conditions affecting energy tolerance	Rapidity of energy reduction	Emergency medical response	Lack of funding for emergency medical Services and rehabilitation services

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Review Questions

647. Ans. (d) Congenital *[Ref. Park 23/e p365]*
648. Ans. (d) Screening for hypertension *[Ref. Park 23/e p368]*
649. Ans. (b) Obesity *[Ref. Park 23/e p400]*
650. Ans. (a) LDL *[Ref. Park 23/e p368]*
651. Ans. (b) Sarcoidosis *[Ref. Internet]*
652. Ans. (d) High intake of vitamin-A *[Ref. Park 23/e p394]*
653. Ans. (b) Coronary heart disease *[Ref. Park 23/e p371]*
654. Ans. (c) 3 months *[Ref. Park 23/e p396]*
655. Ans. (a) 200 *[Ref. Park 23/e p368]*

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CHAPTER 6

National Health Programmes, Policies and Legislations in India

SOME IMPORTANT HEALTH PROGRAMMES OF INDIA

Refer to Annexure 6

REVISED NATIONAL TB CONTROL PROGRAMME

Epidemiology of Tuberculosis in India

- *ARI (India):* 1-2% (average ARI = 1.7%)
- For every 1% rise of ARI, there are 50 SS +ve cases/lac population[Q].

Index	Situation in India	Remark
Incidence of Infection	1–2% (~ 1.7%)	ARI – Tuberculin Conversion Index[Q]
Prevalence of Infection[Q]	40%	Standard Tuberculin Test[Q]
Incidence of Disease	1.7 per 1000	New cases[Q]
Prevalence of Disease	0.2%	All cases

I For every 1% rise of ARI, there are 50 SS +ve cases/ lac population[Q].

I ARI – Tuberculin Conversion Index[Q].

Key Notable Points regarding Tuberculosis

- Every TB sputum positive patient can infect up to 10-15 individuals in a year[Q]
  - *Without treatment, 50% of TB patients will die, 25% will remain healthy and 25% will develop chronic infectious TB.*
- TB is 'Barometer of Social Welfare in India'[Q]
- TB (AFB) Bacillus discovered by: Robert Koch[Q]
  - *TB Bacilli are alcohol and acid fast*[Q]
  - *Generation time of TB bacilli:* 20 hours[Q]
  - *TB bacteria remain alive*: in sputum for 1 day and in droplet nuclei for 10 days[Q]
- *Diagnosis in RNTCP*: Ziehl Neelsen Staining[Q]
- *World TB Day*: 24th March[Q]
- TB was declared as *'Global emergency in 1983'* by WHO[Q]
- *TB is the MC Opportunistic Infection (OI) in HIV in India*[Q]
- *Elimination level for Tuberculosis (WHO and STOP TB Strategy)*[Q]: <1 case per million population (to eliminate TB as a public health problem)
- *TB Institutes of importance in India*:
  - National Tuberculosis Institute (NTI) – Bangalore[Q]
  - Tuberculosis Research Centre – Chennai
  - LRS Institute of TB and Respiratory Diseases – New Delhi

I World TB Day: 24th March.

I National Tuberculosis Institute (NTI) – Bangalore.

Annual Risk of Infection (ARI)

- *Definition*: Is the proportion of population which will be primarily infected with tuberculosis in course of 1 year
- *Public health importance*:
  - Is incidence of infection of TB
  - Is known as 'Tuberculin Conversion Index'[Q]
  - Best indicator of trend of TB unaffected by current control measures[Q]
  - Most informative index of magnitude of problem of TB[Q].

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Zeihl Neelsen (ZN) Staining

- *Importance:* Sputum smear of a suspected TB patient is used for the diagnosis
- *Decolourizer:* 25% sulphuric acid[Q]
- *Acid Fast Bacilli (AFB) of TB*[Q]*:* 'Rod shaped' with 'beaded appearance' (Beads: Mycolic Acid[Q])
  - Minimum bacillary load for a positive result: >10,000 bacilli per ml sputum[Q]
  - Results of ZN staining: Minimum 100 fields examined[Q]

Grading of smears	Criterion
0	No bacilli per 100 oil immersion fields
Scanty	1 – 9 bacilli per 100 oil immersion fields
1+ grading	10 – 99 bacilli per 100 oil immersion fields
2+ grading	1 – 10 bacilli per oil immersion field
3+ grading	> 10 bacilli per oil immersion field

Directly Observed Treatment Short Course (DOTS)

- *Description:* Is a community based Tuberculosis treatment and care strategy which combines the benefit of supervised treatment with community based care and support.
- *Success of DOTS depend upon 5 components*[Q]*:*
  - Political commitment
  - Good quality sputum microscopy
  - Directly observed treatment
  - Uninterrupted supply of good quality drugs
  - Accountability
- *Ensures high cure rates through 3 components:*
  - Appropriate medical treatment
  - Supervision and motivation by a health/non-health personnel
  - Monitoring of disease by health services
- DOTS is given by peripheral health staff – 'DOTS Agents' (MPWs, Voluntary workers like teachers, Anganwadi workers, Dais)
  - Incentive/honorarium paid: 150/- per patient completing treatment
- Drugs are supplied in 'patient-wise boxes containing full course of treatment'
  - Intensive phase: Each blister pack has one day's medication
  - Continuation phase: Each blister pack has one week's medication
- *Principles of DOTS administration:*
  - DOTS is directly observed treatment short course chemotherapy[Q]
  - In DOTS during the intensive phase of treatment a health worker are other trained person watches as the patients swallows the drugs in his presence
  - During continuation phase the patient is issued medicine for one week in multiblister combipack of which the first dose is swallowed by the patient in the presence of health worker or trained person
  - Consumption of medicine in the continuation phase is also checked by return of empty multiblister combipack when patient come to collect medicine for the next week
  - In this programme alternate day treatment is used
  - Streptomycin is given in category II only
  - In category-1 new sputum smear, positive cases sputum examination is done in 2, 4 and 6 months.

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Revised National Tuberculosis Control Programme (RNTCP)

- *Differences in National Tuberculosis Programme (NTP) and RNTCP:*

	NTP, 1962	RNTCP, 1992Q
Objective	Early diagnosis & treatment	Breaking chain of transmission
Operational targets	Not defined	1. Cure rate > 85% 2. Case finding > 70%
Strategy	1. SCC supervised 2. Conventional	1. DOTS 2. Uninterrupted drug supply
Diagnosis	More emphasis on X-rays	Mainly sputum microscopy

- *Objectives of RNTCPQ:*
  - To achieve a cure rate of atleast 85% through administration of short course chemotherapy (SCC), and
  - To achieve a case detection rate of 70% (only after having achieved the desired cure rate)
- *History of RNTCP:*
  - RNTCP (based on DOTS strategy), began as a pilot in 1993 and was launched as a national programme in 1997
  - By 24th March 2006, the entire country was covered under DOTS
- *Infrastructure:*
  - The RNTCP designated 'Microscopy Centre' is established for approx. 100,000 populationQ (50,000 in hilly and mountainous areas)
  - *Senior TB Laboratory Supervisor (STLS)* is one for every 5 microscopy centres
    - 1 STLS per 5 lac populationQ
    - STLS rechecks all +ve slides and 10% of all –ve slides
- Diagnosis in RNTCP:
  - In RNTCP, mainstay of diagnosis is Sputum microscopy; the sputum smears are stained for acid fast Bacilli (AFB) with 'Zeihl Neelson (ZN) Stain'
  - *Decolorizer:* 25% sulphuric acid
  - *Counter-stainQ:* 0.1% Loeffler's methylene blue (or 1% picric acid or 0.2% malachite green).

I **Objectives of RNTCPQ:**
- To achieve a cure rate of atleast 85%.
- To achieve a case detection rate of 70%.

I 1 STLS per 5 lac population.

Endorsed TB Diagnostics under RNTCP 2015

- Smear microscopy for AFB:
  - ZN staining
  - Fluorescence stains examined under Microscopy with/without LED
- Culture methods:
  - LJ media (Solid)
  - Middle Brook media (Liquid) using Bactec/MGIT
- Rapid diagnostic molecular tests:
  - Conventional PCR based Line-probe-assay for MTB complex
  - Real-time PCR based NAAT for MTB complex (GeneXpert)

AFB Sputum Smears (SS) for Diagnosis of a Case of TB [New Guidelines]

- Tuberculosis suspect: A person with productive cough > 2 weeks with or without hemoptysis, fever for > 2 weeks, chest pain, weight loss, night sweats, and loss of appetite is subjected to 2 SS examinations
- Number of specimen(s) required for diagnosis of smear positive pulmonary Tuberculosis: TWOQ
  - '2 sputum smears' over 2 days period:
    Spot Sample (Day 1)
    Morning Sample (Day 2)

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- Chances of detecting smear positive cases:
  - *With 1 sample*: 80%
  - *With 2 samples*: 93%
- Interpretation of results of 2 sputum smear examinations:
  - None sputum positive[Q]: Give antibiotics for 10 – 14 days
    - *Cough relieved:* Non- tuberculosis person
    - *Cough persists:* REPEAT two sputum smear examinations
      (a) *None sputum positive:* X-ray chest
      Findings suggestive of TB: Sputum negative tuberculosis; Start ATT
      No findings suggestive of TB: Non- tuberculosis person
      (b) One sputum positive: Sputum positive pulmonary tuberculosis; Start ATT
      (c) Two sputum positive: Sputum positive pulmonary tuberculosis; Start ATT
    - *One sputum positive*: Sputum positive pulmonary tuberculosis; Start ATT
    - *Two sputum positive*: Sputum positive pulmonary tuberculosis; Start ATT

Categorization and Treatment Regimens in RNTCP[Q] [New Guidelines 2015-16]

Category	Type of patient	Regimens		Duration (months)
		IP	CP	
Cat I	New SS+ve, New SS–ve Seriously ill extra-pulmonary	$2(HRZE)_3$	$4(HR)_3$	6 months
Cat II	SS+ve relapse SS+ve failure SS+ve treatment after default	$2(HRZES)_3$ + $1(HRZE)_3$	$5(HRE)_3$	8 months
Cat IV*	MDR TB	4(KLCZEEt)	12-18 (LCEEt)	18–24 months
Cat V	XDR TB	6-12 (HhCmCzLAMP)	18 (HhCzLAMP)	24–30 months

(*Category IV - Dots Plus; Category III has been merged in Category I)

- *Letters*: R-Rifampicin, E-Ethambutol, H-Isoniazid, S-Streptomycin, Z-Pyrazinamide, K-Kanamycin, L-Levofloxacin, Et-Ethionamide, C-Cycloserine, Hh-High dose Isoniazid, Cm-Capreomycin, Cz-Clofazimine, L-Linezolid, A-Amoxy-Clav, M-Moxifloxacin, P-PAS
- *Numbers*: The numbers before letters refer to months of treatment (2 imply two months of treatment). The numbers after letters refer to frequency of administration per week (3 imply thrice per week).
- *Seriously ill extra-pulmonary TB*: Meningitis, disseminated TB, tuberculous pericarditis, peritonitis, bilateral or extensive pleurisy, spinal disease with neurological complaints, SS –ve TB with extensive parenchymal involvement, and intestinal and genitourinary TB.

Daily Self-administered Non-DOTS RegimesQ [New Guidelines]

- *Indication:* ONLY if there are adverse reactions to drugs or patients compliance is not possible

Non-DOTS regime 1 (ND1) Pulmonary (SS+ve) seriously ill Extra-pulmonary seriously ill	2 (SHE) + 10 (HE)
Non-DOTS regime 2 (ND2) Pulmonary (SS–ve) not seriously ill Extra-pulmonary not seriously ill	12 (HE)

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AFB Sputum Smears (SS) for Follow-up of a Case of TB during Treatment$_Q$ [New Guidelines]

- '2 sputum smears' over 2 days period
- Interpretation of results of 2 sputum smear examination:
  - *None +ve*: Declared SS –ve
  - *One +ve*: Declared SS +ve
  - *Two +ve*: Declared SS +ve
- If SS +ve at end of Intensive Phase (IP)[Q]:
  - *Cat I:* Extend IP by 1 month. Do SS examination at end of extended IP. Transfer the patient to Continuation phase (CP), irrespective of SS examination results
  - *Cat II:* Extend IP by 1 month. Do SS examination at end of extended IP. Transfer the patient to Continuation phase, irrespective of SS examination results.
- *Follow-up smears examination timings:*

Category	If SS –ve at end of IP[Q]	If SS +ve at end of IP[Q]
Category I	2m, 4m, 6m	2m, 3m*, 5m, 7m
Category II	3m, 5m, 8m	3m, 4m*, 6m, 9m
Category IV	IP: Once/month CP: Once/3 months	-

(*Irrespective of SS examination results, patients is started with CP treatment)

Some Important Working Definitions in RNTCP

- *New Case[Q]:* A person suffering from TB who has 'never taken treatment or took treatment for <4weeks (1 month)'
- *Cured[Q]:* Sputum smear positive (SS +ve) who has completed treatment, and had 'sputum smear negative (SS –ve) on atleast 2 separate occasions with one at the end' (completion of treatment)
- *Relapse:* A person 'declared cured returns back as SS +ve'
- *Failure[Q]:* A person on treatment who is SS +ve at or after 5 months of treatment
- *Defaulter[Q]:* A person who, at any time after registration, 'has not taken anti-TB drugs for 2 months or more consecutively'.

Failure[Q]: A person on treatment who is SS +ve at or after 5 months of treatment.

Drug Resistance in TB

- *Primary (Initial) Resistance:* When a person contract infection from a person with resistant bacilli of TB
- *Secondary (Acquired) Resistance:* Resistance developing during the course of treatment for TB
- *Multidrug Resistant TB (MDR–TB)[Q]:* Resistance to Isoniazid and Rifampicin 'with or without resistance to other drugs'
  - *Treatment of MDR-TB[Q]:*
    - DOTS PLUS (Category IV)
    - Must be done on basis of sensitivity testing
  - Directly observed therapy certainly helps to improve outcomes and is considered an integral part of MDR-TB treatment
  - When sensitivities are known and the isolate is confirmed as resistant to both INH and RMP, five drugs should chosen in the following order[Q] (based on known sensitivities):
    - Aminoglycoside (e.g., amikacin, kanamycin) or polypeptide antibiotic (e.g., capreomycin)
    - pyrazimamide
    - ethambutol
    - fluoroquinolones: moxifloxacin preferred
    - rifabutin

Treatment of MDR-TB[Q]:
- DOTS PLUS (Category IV).

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- cycloserine
- thioamide: prothionamide or ethionamide
- PAS
- macrolide: e.g. clarithromycin
- linezolid
- high-dose INH (if low-level resistance)
- interferon-alpha
- thioridazine

- *Extensive Drug Resistant TB (XDR–TB)*[Q]*:* Resistance to rifampicin and isoniazid AND to any member of the quinolone family AND to one of the injectable second-line drugs (kanamycin, capreomycin, or amikacin)
  - XDR–TB is MDR TB with further resistance to 3 – 6 classes of second line drugs (Older definition[Q])
  - Principles of treatment for MDR-TB and for XDR-TB are same
  - XDR-TB does not transmit easily in healthy populations, yet is capable of causing *'epidemics in populations which are already stricken by HIV'*
- *Drug Resistance (TB) in India:*

Primary drug resistance	3-13%
INH	11-22%
Rifampicin	0-12%
Acquired drug resistance	
INH	34-67%
Rifampicin	0-53%
MDR – TB[Q]	3-42%

Weight bands in RNTCP

New Pediatric TB Weight bands (Six)	New MDR TB Weight bands (Five)
6-8 Kg	<16 kg
9-12 kg	16-25 kg
13-16 kg	26-45 kg
17-20 kg	46-70 kg
21-24 kg	>70 kg
25-30 kg	

Antitubercular Drugs

Bactericidal drugs[Q]	Bacteriostatic drugs[Q]
Isoniazid Rifampicin Streptomycin Pyrizinamide	Ethambutol
Ciprofloxacin Ofloxacin Kanamycin	Thiaacetazone Cycloserine PAS Ethionamide

- *Isoniazid:*
  - First effective bactericidal drug used to treat tuberculosis
  - May be bacteriostatic at lower concentrations
  - Acts on extracellular as well as intracellular organisms
- *Rifampicin:*
  - Only bactericidal drug effective against *'persisters'* or dormant bacilli in solid caseous lesions[Q]
  - Acts on extracellular as well as intracellular organisms[Q]

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  - Acts best on slowly or intermittently dividing (spurters)[Q]
- *Pyrazinamide:*
  - Acts on intracellular bacilli
  - Acts on bacilli at sites of inflammatory response

Dosages of Antitubercular Drugs

Drugs	Daily therapy[Q]	Thrice weekly therapy[Q]
Isoniazid	5 mg/kg	10 – 15 mg/kg
Rifampicin	10 mg/kg	10 mg/kg
Pyrizinamide	25 mg/kg	35 mg/kg
Streptomycin	15 mg/kg	15 mg/kg
Ethambutol	15 mg/kg	30 mg/kg

Important Facts of Antitubercular Drugs

- *Most effective anti-tubercular drug:* Rifampicin[Q]
- *Most bactericidal antitubercular drug:* Rifampicin[Q]
- *Most toxic antitubercular drug:* Isoniazid
- *Antitubercular drug causing rapid sputum conversion:* Rifampicin
- *Antitubercular drug causing orange discoloration of urine:* Rifampicin[Q]
- *Antitubercular drug first to develop resistance:* Isoniazid[Q]
- *Antitubercular drug contraindicated AIDS patients on Protease Inhibitors:* Rifampicin[Q]
- *Antitubercular drug contraindicated in HIV:* Thiacetazone[Q] (Exfoliative dermatitis)
- *Antitubercular drugs contained in all phases of all categories of DOTS:* Rifampicin and Isoniazid[Q]
- *Injectable Antitubercular drug:* Streptomycin[Q]
- *Antitubercular drug contraindicated in pregnancy:* Streptomycin[Q]
- *Antitubercular drug contraindicated in children < 6 years age:* Ethambutol[Q]
- *Antitubercular drug causing Optic neuritis (Red-Green color blindness):* Ethambutol[Q]
- *Antitubercular drug causing vestibular damage:* Streptomycin[Q]

I Antitubercular drug causing Optic neuritis (Red-Green color blindness): Ethambutol.

NATIONAL POLIO ELIMINATION PROGRAMME (NPEP)

Pulse Polio Immunization (PPI) Programme in India

- *Launched in India:* 1995–96[Q] (1st round on 9th Dec 1995 and 20th Jan 1996)
  - First PPI targeted children < 3 years age
  - Later on WHO recommended age group be 0-5 years (1996-97)
- *Meaning of 'Pulse'*[Q]**:** Sudden, simultaneous mass administration of Oral Polio Vaccine (OPV) on a single day to *'all children 0–5 years age'*, irrespective of their previous immunization status
  - PPI replaces wild virus with vaccine virus from the community
  - PPI is over and above routine immunization
- *Intensive Pulse Polio Immunization* (*IPPI*)[Q]: Intensification of PPI has been done by adding additional rounds at fixed booths followed by *'house-to-house search-and-vaccinate'* component
- *Success of PPI* (*India*): 35000 cases annually in 1995-96 to NIL case in 2013

Basic Strategies to Eradicate Poliomyelitis from India[Q]

- Routine immunization
- PPI/National Immunization Day (NID)/ Sub-NID (SNID)

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- Surveillance of acute flaccid paralysis (AFP)
- Conduct extensive house-to-house immunization mopping-up campaigns

Vaccine Vial Monitor (VVM)

- *Description:* A simple tool (sticker on OPV vial) which enables vaccinator to know *'whether vaccine is potent'* at the time of administration[Q]
- Mandatory since 1998 for quality assurance
- *WHO Grading of VVM (OPV):*

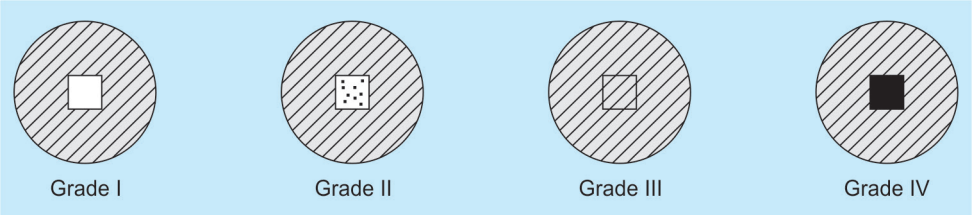

Figure: VVM (Vaccine Vial Monitor)

Acute Flaccid Paralysis (AFP) Case Investigation[Q]

- *Acute Flaccid Paralysis (AFP):* Acute onset (< 4 weeks) in a child aged <15 years, or any case of paralytic illness in a person of any age when polio is suspected
  - *Acute:* rapid progression of from onset to maximum paralysis
  - *Flaccid:* loss of muscle tone, 'floppy' as opposed to spastic or rigid
  - *Paralysis:* weakness, loss of voluntary movement
- *Differential diagnosis of AFP[Q]:* Descending asymmetric flaccid LMN paralysis
  - Guillain Barre Syndrome (Cytologico-albuminic dissociation[Q])
  - Transverse myelitis (Normal CSF, sensory loss +, bladder dysfunction +)
  - Traumatic neuritis (any age, only one leg involved)
  - Other Non-polio enteric viruses: Coxsackie-B, ECHO, Enterovirus type 70 and 71, Mumps
- *Active case search in the community:* In the community where an AFP case resides or where an AFP case has visited during the incubation period for polio (4-25 days before paralysis onset[Q]), a house-to-house active case search is conducted to find additional AFP cases that may have occurred
  - This activity is carried out immediately along with ORI
  - A search is conducted for any children <15 years who have had the onset of AFP within the preceding 60 days[Q]
  - All cases that are found are investigated immediately, with collection from the case of two stool specimens before administration of OPV
- *Adequate stool sample collection[Q]:* From every case of AFP, stool samples are collected for diagnosis of cases of poliomyelitis
  - 2 stool samples
  - 24 – 48 hours apart
  - Within 14 days of onset of paralysis[Q] (or maximum 8 weeks)
  - Each 8 grams (adult thumb size) weight[Q]
  - Collect in clean, dry screw-capped container (need not be sterile, no preservative/ transport media required)
  - Transport to laboratory in *'Reverse cold chain'*[Q] (+2° to +8°C)
  - Standard Lab Request Form (LRF) filled accompany the specimens
- *Outbreak response immunization (ORI):* Following the AFP case investigation and stool specimen collection, ORI is organized in community
  - Children aged 0-59 months are given one dose of OPV regardless of previous immunization[Q] (in the village/locality of the AFP case)

I Transport to laboratory in 'Reverse cold chain'[Q] (+2° to +8°C).

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- Travel history of the child with AFP may suggest additional places of stay where ORI should also be conducted
- Atleast 500 children are vaccinated[Q]

- *60-day follow-up in a case of Acute Flaccid Paralysis (AFP)[Q]:* The District Immunization Officer (DIO) must visit every case of AFP 60 days after onset of paralysis *'to confirm the presence or absence of residual weakness[Q]'*
  - Activity completed before 70th day
  - *Minimal levels of residual weakness can usually be detected by:*
    - Mid-arm or mid-thigh circumference: Reveal wasting on one side
    - Asymmetry in the skin folds on medial aspects of thigh

I Visit every case of AFP 60 days after onset of paralysis 'to confirm the presence or absence of residual weakness[Q]'.

WHO Indicators of AFP Surveillance & Laboratory Surveillance

- *Two most critical indicators[Q]:*
  - *Non-polio AFP rate in children < 15 years of age (Target > 1/100,000[Q]):* If it is < 1/100,000 then the surveillance system is probably missing cases of AFP
  - Reported AFP cases with 2 stool specimens collected < 14 days since paralysis onset[Q] (Target > 80%).
- *Other Indicators:*
  - Timeliness of weekly 'zero reporting' (Target > 80%)
  - Reported cases investigated < 48 hours of report (Target > 80%)
  - Completeness of weekly 'zero reporting' (Target > 90%[Q])
  - Reported AFP cases with a follow-up exam at least 60 days after paralysis onset to verify the presence of residual paralysis or weakness (Target > 80%):
  - *Specimens arriving at the national lab < 3 days of being sent* (Target > 80%)
  - *Specimens arriving at the laboratory in 'good condition'[Q]* (Target > 80%)
    - there are frozen ice packs or ice, or a temperature indicator (showing < 8° C)
    - the specimen volume is adequate (> 8 grams)
    - there is no evidence of leakage or desiccation
    - appropriate documentation (laboratory request/reporting form)
  - *Specimens with a 'turn-around time' < 28 days (Target > 80%):* The turn-around time is the time between specimen receipt and reporting of results
  - *Stool specimens from which a non-polio enterovirus is isolated (Target > 10%):* An indicator of the quality of the 'reverse cold chain'

AFP and Poliomyelitis Data – India [Till 15th November, 2015]

Year	No. of AFP cases	No. of polio cases	P1 type	P2 type	P3 type
2013	49,950	NIL*	0	5 (VDPV)	0
2014	46,171	NIL	0	3 (VDPV)	0
2015	46,459	NIL	0	2 (VDPV)	0

RCH PROGRAMME2

RMNCH+A (Reproductive, Maternal, Newborn, Child and Adolescent Health) Strategy

- *PLUS indicates:*
  - Inclusion of adolescence as a distinct 'life stage'
  - Linking of maternal and child health to reproductive health and other components
  - Linking of community and facility-based care as well as referrals
- *Goals for RMNCH+A strategy (As per 12th Five year plan)[Q]:*
  - Reduction of IMR to 25 per 1,000 live births by 2017
  - Reduction in MMR to 100 per 100,000 live births by 2017
  - Reduction in TFR to 2.1 by 2017

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Adolescents Priority interventions: Nutrition; IFA supplementation Adolescent health clinics Information and counselling Menstrual hygiene Preventive health checkups	***Reproductive health Priority interventions:*** Community-based promotion and delivery of contraceptives Promotion of spacing methods (interval IUCD) Sterilization services (vasectomies and tubectomies) Comprehensive abortion care (includes MTP Act) Prevention and management of STI/RTI
New born and Child care Priority interventions: Home-based newborn care, prompt referral Child nutrition, Micronutrients supplementation Immunization IMNCI Facility-based care of the sick newborn Early detection and management of 4Ds	***Pregnancy and Child birth Priority interventions:*** AN care & tracking of high-risk pregnancies Skilled obstetric care Immediate essential newborn care & resuscitation Emergency obstetric and new born care Postpartum care, IUCD and sterilization Implementation of PC & PNDT Act

(4Ds: Defects, Deficiencies, Diseases and Disability in children (0–18 years)

- *5 X 5 Matrix of RMNCH+A: Minimum Essential commodities*[Q]

Reproductive health	Maternal health	Newborn health	Child health	Adolescent health
FP commodities: Tubal rings, CuT 380A, IUCD 375	Injection Oxytocin	Injection Vitamin K	ORS	Tablet Albendazole
OCPs, Mala N, Condoms	Tablet Misoprostol	Mucus extractor	Zinc dispersible tablets	Tablet Dicyclomine
Emergency contraceptive pills (LNG 1.5 mg)	Inj. Magnesium sulphate	Vaccines: BCG, OPV, HepB	Salbutamol syrup/ nebulising solution	
Pregancy testing kits - Nischay			Vaccines: DPT, OPV, Measles, Hep-B, JE, Pentavalent vaccine	
Tablet Mifepristone			Syrup Vitamin A	

  - All facilities must have IFA tablets, IFA syrup, PCM, Chloroquine, Dexamethasone, Trimethorim-Sulphamethoxazole, Amoxycillin, Ampicillin, Gentamicin, Ceftriaxone, Thermometer, Weighing scale, BP apparatus, Stop watch, Cold box, Vaccine carrier, Oxygren Bag & mask, Testing equipments of Sugar/ Hemoglobin/ Urine

Components of Reproductive and Child Health Programme

- Community Needs Assessment Approach (CNAA)
- Integrated packages of services for mother and child
- MTP services at PHC and safe abortion
- Control and prevention of RTI/ STI
- Adolescent health
- Services in urban slums
- Improving quality of services
- Unmet needs and sub-centre action plans
- Communication strategy
- Gender sensitiveness
- Greater involvement of Panchayati Raj Institutions (PRIs), NGOs and community

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BEmONC and CEmONC Components[Q]

BEmONC	CEmONC
Basic Emergency Obstetric & Newborn Care	Comprehensive Emergency Obstetric & Newborn Care
24 hour delivery & neonatal services [a]	Additional services
Level II facilities	Level III facilities
24 X 7 PHC, CHC [a]	District hospital, 1 FRU per 500,000 population [a]
Manual removal of placenta Antibiotics Anticonvulsants Uterotonics Vacuum assisted delivery MVA off retained products of conception Newborn resuscitation	All components of BEmONC Surgical capability Blood transfusion

(Level I facilities include other PHCs/ Subcentres/ delivery points; MVA: Manual vacuum aspiration)

Couple Protection Rate (CPR)

- *Definition*[Q]*:* Is defined as the percent of eligible couples protected against childbirth by one of the approved methods of family planning, i.e. condoms, oral pills, IUDs or sterilization
  - CPR is an indicator of 'contraceptive prevalence in a community'[Q]
  - Demographers believe that 'NRR = 1 can be achieved only with CPR > 60%'[Q]: Thus goal under the earlier National Population Policy was CPR 60% by 2000
- *Effective Couple Protection Rate (ECPR):* Is defined as the percent of eligible couples 'effectively' protected against childbirth by one of the approved methods of family planning, i.e. condoms, oral pills, IUDs or sterilization.

IFA Tablets & Iron Deficiency Anaemia

- *Iron and Folic Acid content per IFA tablet:*
  - *Adult tablet:* 100 mg elemental iron and 500 mcg folic acid[Q]
  - *Pediatric tablet:* 20 mg elemental iron and 100 mcg folic acid[Q]
  - *For preterm infants, IFA tablet:* 10 – 15 mg elemental iron and 100 mcg folic acid
- 'National Nutritional Anemia Prophylaxis Programme' was launched in 1970 to prevent nutritional anaemia in mothers and children
  - This programme is being taken up by MCH Division of Ministry of Health and Family Welfare; now it is part of RCH programme.
- *Prevalence of Iron Deficiency Anemia (IDA) in India:* [NFHS – 3, 2005 – 06]

Group	Anemia cut off level	Anemia type	Prevalence
Children (6 – 59 months)	< 11.0 gm/dl[Q] 10.0 – 10.9 gm/dl 7.0 – 9.9 gm/dl < 7.0 gm/dl	Any Mild Moderate Severe	70% 27% 40% 03%
Women (15 – 49 years)	< 12.0 gm/dl[Q] 10.0 – 11.9 gm/dl 7.0 – 9.9 gm/dl < 7.0 gm/dl	Any Mild Moderate Severe	55% 38% 15% 02%
Men (15 – 49 years)	< 13.0 gm/dl[Q] 12.0 – 12.9 gm/dl 9.0 – 11.9 gm/dl < 9.0 gm/dl	Any Mild Moderate Severe	24% 13% 10% 01%

I Adult tablet: 100 mg elemental iron and 500 mcg folic acid[Q].

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Integrated Management of Neonatal and Childness Illness (IMNCI)

- *IMNCI **is a** 'strategy for reducing morbidity and mortality associated with major causes of childhood illness'*
- *Curative component includes management of*[Q]**:**
  - Diarrhoea
  - Measles
  - Pneumonia
  - Malaria
  - Severe malnutrition and nutritional counseling
- *Health promotive and preventive component:*
  - Breast feeding
  - Nutritional counseling
  - Vitamin A and iron supplementation
  - Immunization
  - Treatment of helminthic infestation
- *Target:* Children < 5 years age[Q]
  - Children < 2 months age
  - Children aged 2 months – 5 years
- *Components of IMNCI strategy:*
  - Improving case management skills of health care staff
  - Improving overall health systems
  - Improving family and community health practices
- *Case management process*[Q]*:* Is presented in a series of charts (**Mnemonic: A C**ase **I**s **T**reated & **C**are **G**iven)
  - **A**ssess the young infant or child
  - **C**lassify the illness
  - **I**dentify the treatment
  - **T**reat the infant or child
  - **C**ounsel the mother
  - **G**ive follow-up care
- IMNCI is the Indian adaptation of IMCI (Integrated Management of Childhood Illness); major highlights of Indian adaptation are[Q],
  - Inclusion of early neonatal age (0 – 7 days age) in programme
  - Incorporating national guidelines on malaria, anemia, Vitamin-A supplementation and immunization schedule
  - Training of health workers begin with sick young infants up to 2 months
  - Proportion of training time devoted to sick young infant and sick child is almost equal
  - Is skill based

I

Curative component includes:
- Diarrhoea
- Measles
- Pneumonia
- Malaria
- Severe malnutrition and nutritional counseling

I

Colour Coding:
- PINK: Pre-referral treatment + Refer urgently to hospital
- YELLOW: Specific treatment at PHC
- GREEN: Home based management

Quality Indicators to Monitor and Evaluate RCH Programme[Q]

- No. of RTI/STI cases detected, treated, referred
- No. of ANC cases registered – Total and less than 12 weeks
- No. of pregnant females with 3 antenatal checkups
- No. of high risk pregnant females referred
- No. of pregnant females who had received 2 doses of TT
- No. of pregnant females under anaemia prophylaxis and treatment
- No. of ANC cases with complication referred to PHC/ FRU
- No. of deliveries by trained and untrained birth attendant
- No. of women given 3 Post natal checkups
- No. of newborns with birth weight recorded
- No. of children fully immunised
- No. of adverse effects following immunization (AEFI)
- No. of cases of ARI and diarrhoea under 5 years treated, referred, deaths
- No. of cases motivated, followed up for contraception.

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NATIONAL PROGRAMME FOR CONTROL OF BLINDNESS (NPCB)

Blindness in India

- *India is single largest contributor to global blind pool*
  - *Measured according to:* NPCB criterion (<6/60 in BEBPC[Q])
  - *Total estimated no. of blind persons: 15 million*
- *Current prevalence:* 1.05%
  - *State with highest prevalence of blindness:* Jammu & Kashmir[Q]
  - *State with lowest prevalence of blindness:* Meghalaya
  - *Prevalence after correction:* 0.56% [2001–02]
  - *Prevalence of blindness in age >50 years:* 8.5%
  - *Prevalence of one-eyed blindness:* 0.8% (MCC: Cataract – 73%)
- India is 'overestimating the no. of blinds as per WHO definition[Q]'
  - If WHO cutoff (<3/60 in BEBPC) is employed in India, estimated prevalence of blindness would be: 0.7%[Q]
- *Blindness in India includes:* Economic Blindness, Social Blindness, Manifest Blindness and Absolute Blindness (WHO blindness includes Social Blindness, Manifest Blindness and Absolute Blindness)
  - *MCC of Blindness (India)*: Cataract[Q].

I MCC of Blindness (India): Cataract[Q].

Strategies of National Programme for Control of Blindness (NPCB, 1976)

- Strengthening service delivery
- Developing human resources for eye care
- Promoting outreach activities and public awareness
- Developing institutional capacity
- To establish eye care facilities for every 5 lac persons

I NPCB Blind < 6/60

Revised Strategies of NPCB[Q]

- *To make NPCB more comprehensive by:*
  - Strengthening services for other causes of blindness like corneal blindness and refractive errors in school children
  - Improving follow-up services of cataract operated persons
  - Treating other causes of blindness like glaucoma
- To strengthen participation of voluntary organizations
- To shift from eye camp approach to fixed facility surgical approach[Q]
- To enhance coverage of eye services in tribal & underserved areas
- To expand World Bank project activities:
  - Construction of dedicated eye OTs and eye wards
  - Training of eye surgeons
  - Modern cataract surgery
  - Supply of ophthalmic equipment.

I WHO Blind < 3/60

Organizational Structure for NPCB

Organizational level	Infrastructure developed/upgraded
Tertiary Level	Regional institutes of Ophthalmology Upgraded medical colleges Medical colleges designated as training centers for PMOAs Eye banks
Secondary level	District hospitals upgraded NGO eye hospitals
Primary level	Sub-district level hospitals/ CHCs Mobile Ophthalmic Units Upgraded PHCs Link workers/ Panchayats

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- NPCB was launched in 1976 as a '100% Centrally sponsored programme'
  - India was the 'first country to launch a national level programme for blindness'Q
- *Apex institute:* National Institute of Ophthalmology (Dr. Rajendra Prasad Centre for Ophthalmic Sciences [2007] AIIMS, New Delhi)Q
- *NPCB cut-off for blindness:* <*6/60 in better eye*
  - Prevalence of blindness in general population: *1.05% (MCC: Cataract 77%) [2007]*Q
  - Cataract surgery rate required to clear the backlog of blindness: *340 operations per lac population [2007]*Q
  - IOL implantations in cataract surgeries: *34% [2007]*Q

Definition and Causes of Blindness in NPCB

	World	India (NPCB, India)
BlindnessQ	'visual acuity of <3/60 in better eye with best possible correction'	'visual acuity of <6/60 in better eye with best possible correction'
Prevalence	0.6% [2002]	1.05% [2007]
CausesQ	Cataract (48%) – MCC Glaucoma (12%) Uveitis (10%) ARMD Trachoma Corneal opacity Diabetic Retinopathy Others	Cataract (77%) – MCC Refractive Error Glaucoma Posterior segment pathology Corneal opacity Other causes

Important Points of Blindness

- *Goal for Blindness in National Health Policy (NHP) 2002*Q*:* Reduce prevalence of Blindness to 0.5% by 2010 [NEW GOAL 0.3% by 2020]
- *About 80% of blindness is avoidable*
- *Legal Blindness*Q*:* Visual acuity <6/60 (<20/200) OR Visual field <20° in better eye with best possible correction
- *Work Vision*Q*:* <6/60 (Economic Blindness)
- *Walk Vision*Q*:* <3/60 (Social Blindness).

School Eye Screening (SES) Programme

- Focus on middle school (V – VIII class) covering 10 – 14 years ageQ
  - 150,000 children to be screened per block
- One trained teacher to handle 150 studentsQ
  - 1 – day training for teacher at nearest PHCQ
  - Teacher Kit: Vision screening cards, referral cards, tape/rope to measure 20 feet
- *Visual cut-off for referral to nearest PHC:* <6/9 in either eyeQ
- *Prerequisites for undertaking SES:*
  - Para-medical Ophthalmic Assistant (PMOA) availableQ
  - Relevant equipments procured
  - Optician contracted for providing spectacles

Vision 2020 – Right to Sight Initiative

Refer to Chapter 5, Theory

- *International organisations involved in Vision 2020:*Q
  - WHO
  - Orbis
  - International Agency for Prevention of Blindness

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- International Eye Foundation
- International Federation for Ophthalmological Societies
- International Organisation against Trachoma
- Rotary International
- World Blind Union
- World Council of Optometry
- International Association of Lions Club
- Sight Savers International
- Helen Keller International.

Cataract Blindness Control Project (CPCB)

- The Government of India obtained a soft loan from the *'World Bank'*[Q] to control cataract blindness in 7 states of country for the period 1994-2002
- *Activities undertaken in the project:*
  - Establishment and functioning of 'District Blindness Control Societies (DBCS)'
  - Construction of eye theatre/eye wards in District hospitals
  - Supply of Ophthalmic equipment
  - Intra-Ocular Lens (IOL) implantation in District Hospitals
  - Training of surgeons in IOL surgery, and
  - Assistance to NGOs for setting up of eye care facilities

NATIONAL HIV/AIDS CONTROL PROGRAMME (NACP)

3 by 5 Initiative[Q]

- *People living with HIV/AIDS (PLHA) in World:* 40 million
- *3 by 5 Target:* Announced by WHO and UNAIDS on December 1, 2003
- *Interim target:* Providing anti-retroviral treatment (ART) to '3 million people living with HIV/AIDS (PLHA)', in developing countries (low & middle income), by end of 2005[Q]

HIV Screening in NACP

- *Tests for Screening of HIV*[Q]*:* E/R/S Battery
  - ELISA (E) Test
  - RAPID (R) Test
  - SIMPLE (S) Test
- *Confirmatory diagnosis of HIV:* Western Blot Assay[Q]
- *Screening strategies of HIV*[Q]*:*
  - *Strategy I:* One out of three screening tests (E/R/S) are used
    - Done for screening every blood unit before transfusion
    - Does not recommend its use for diagnosis of HIV in a person
  - *Strategy II:* Two out of three screening tests (E/R/S) are used
    - Done for screening person who is symptomatic with any one of AIDS defining illness (NACO guidelines)
  - *Strategy III*: All three screening tests (E/R/S) are used
    - Done for screening person who is asymptomatic
- *ELISA Test:* first screening test commonly employed for HIV
  - It has a high sensitivity.

I

Tests for Screening:
- ELISA
- RAPID
- SIMPLE

HIV Diagnosis Tests

- *Western Blot Assay (Immunoblot):* Is a method to detect a specific protein[Q] in a given sample of tissue homogenate or extract.
  - Used as a confirmatory test for HIV (NACP, India).
  - *Based on detecting*[Q]*:* Viral core protein (p24) and envelope glycoprotein (gp 41)

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- p24 Antigen Test
- Nucleic-acid-based tests
- RT-PCR test
- Quantiplex bDNA or branched DNA test

Targeted Interventions in NACP[Q]

- *Basic purpose:* To reduce transmission of HIV amongst most vulnerable populations.
- *Approach:* Combines a comprehensive and integrated approach to vunerable segments of population.
- *Main activities:*
  - Behaviour change
  - Communication
  - Treatment of STD
  - Create enabling environment to facilitate behaviour change
- *Segments of population covered[Q]:*
  - Sex workers
  - Injecting Drug Users
  - Truckers
  - Homosexual men (MSM-Men having sex with men)
  - Migrant labourers
  - Street children

Opt-in/Opt-out Testing

- *Opt-in testing[Q]:* Testing is offered and the patient is required to actively give permission before it can occur
- *Opt-out testing[Q]:* Means performing an HIV test after notifying the patient that the test is normally performed, but that the patient may elect to decline or defer testing; assent is then assumed unless the patient declines testing
  - WHO and CDC recommends opt-out testing policies in health care settings
  - Opt- out testing has a higher (85-98%) testing rate than opt- in testing (25-83%)
  - It does NOT eliminate the need for informed consent.

I WHO and CDC recommends opt-out testing policies in health care settings.

LAC (Link ART Centre)

- Providing ARV drugs to patients on ART
- Monitoring of patients on ART
- Treatment of minor Opportunistic Infections (OIs)
- Identification and management of side-effects
- Reinforcement of drug adherence on every visit

LAC PLUS (LAC services PLUS Pre-ART management)

- Help in integrating HIV care into general health system
- Reduce loss of patients between ICTC and Care Support and Treatment (CST) services

ART Plus[Q]

- Second line ART drugs in NACP

'ALL IN' Initiative (Global Initiative to End Adolescent AIDS)

- Description: A partnership between UNAIDS and UNICEF to reach adolescents with HIV services and to end the AIDS epidemic by 2030
- Four key action areas:
  - Adolescents as leaders and actors of social change

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  - Improving data collection
  - Encouraging innovative approaches to reach adolescents
  - Placing adolescent HIV firmly on political agendas
- Fast-Track Targets to be achieved by 2020:
  - Reducing new HIV infections by at least 75%
  - Reducing AIDS-related deaths by 65%
  - Achieving zero discrimination
- Main Goals:
  - Ending adolescent AIDS by 2030
  - Ending the global AIDS epidemic as a public health threat

NATIONAL VECTOR BORNE DISEASES CONTROL PROGRAMME (NVBDCP)

Introduction to NVBDCP

- NVBDCP covers 6 vector borne diseases[Q] of public health importance in India:

Disease	Main vector
Malaria	Female Anopheles
Filariasis	Culex quinquefasciatus (C. fatigans)
Dengue	Aedes aegypti
Kala Azar	Sandfly (Phlebotamus)
Japanese Encephalitis	Culex tritaeniorhynchus
Chikungunya fever	Aedes aegypti

NVBDCP: Malaria

Modified Plan of Operation (MPO)[Q]

- *Modified Plan of Operation (MPO):* In 1977, attempts at malaria eradication were given up and under review policy MPO was launched
- *Under MPO, areas were divided on the basis of API[Q]:*
- *Areas with API > 2:*
  - Regular insecticide spray (interval 6 weeks)[Q]

Condition	Insecticide	Dose and frequency
Non-refractory to DDT	DDT	1.0 gm per square metre; 2 rounds
Refractory to DDT	Malathion	2.0 gm per square metre; 3 rounds
Refractory to Malathion	Pyrethroids	0.25 gm per square metre;2 rounds

  - Entomological studies
  - Malaria surveillance
  - Treatment of cases
  - Intensify efforts in rural areas (providing input under Plasmodium falciparum Containment Programme with SIDA)
  - Decentralization of lab services to PHC level
  - Establishment of Drug Distribution Centers (DDCs) and Fever Treatment Depots (FTDs)
- *Areas with API < 2:*
  - Focal spray of DDT (or BHC or Malathion) if a case of Pf occurs in the area[Q]
  - Active and passive surveillance
  - Presumptive treatment to all suspected fever cases
  - Ensuring radical treatment to those found positive on blood smear
  - Epidemiological investigation of case to determine causative factors

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Fever Treatment Depots (FTDs) and Drug Distribution Centres (DDCs)

Fever Treatment Depots[Q]	Drug Distribution Centres
FTD holder given training at PHC 1. Collection of blood smears 2. Giving presumptive treatment 3. Impregnation of bed nets 4. Promotion of larvivorous fishes	DDC established (if no FTD) 1. Giving presumptive treatment 2. Impregnation of bed nets 3. Promotion of larvivorous fishes

Malaria Diagnosis

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Malaria: 1 microscope per 30,000 population.

- *Diagnosis of malaria in NVBDCP (malaria component):* Peripheral blood smear[Q]
  - *Two types of smear,*
    - *Thick smear (Sensitivity):* Presence of malaria[Q]
    - *Thin smear (Specificity):* Species identification[Q]
  - *Stain used:* JSB (Jaswant Singh Bhattacharaya) Stain[Q]
  - 1 microscope per 30,000 population at PHCs in rural areas[Q] and for 50,000 population in urban areas
  - Dipstick test in selected areas
  - 'Link Worker' per 2000 population[Q] in high Pf areas (collects smears, provides presumptive treatment and forwards slides to PHCs)
  - 1 Fever Treatment Depot (FTD) in every village.
- *Rapid tests for diagnosis of Pf:*
  - Dipstick test (Pf Histidine rich protein II – HRP II)
  - Leishman stain
  - Field's stain
  - Acridine orange
- 'Dipstick Test' is used for the rapid diagnosis of Plasmodium falciparum (Pf)
  - Is a 'rapid whole blood immuno-chromatographic test'
  - Uses 2 antibodies specific for 'Pf Histidine Rich Protein II Antigen'[Q]
  - Is a 'antigen capture assay'
  - Colloidal gold is used in the test card
  - Gives results in 3 – 5 minutes
  - Specificity and negative predictive value is 99%
  - Not as effective when parasite levels < 100 parasites/ml of blood
- *Optimal Test [Parasite-specific lactic dehydrogenase (LDH dipstick test)]:* Positive in P.falciparum and P.vivax parasitaemia; It is a simple and rapid, and superior to HRP II[Q].

Enhanced Malaria Control Project (EMCP)

- World Bank supported project for six crore tribal population in 8 states
- *Selection criteria for PHCs in EMCP[Q]:*
  - Annual parasitic incidence (API) > 2 in last 3 yrs
  - Pf cases >30% of all malaria cases
  - 25% of population is tribal
  - Area has been reporting deaths due to malaria (and has flexibility to direct resources to needy areas in case of outbreak)

Insecticide Treated Bed Nets (ITBN)

- Insecticide treated Bed nets (ITBN) Programme (esp. deltamethrin) has resulted in significant decline in malaria incidence and API
  - Average decline in anopheline mosquito density – 68%
  - Average decline in culicine mosquito density – 50%

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- *Chemicals used in ITBN Programme:* Synthetic pyretheroids[Q]
  - Deltamethrin: 2.5 % in dosage of 25 mg/m^2
  - Cyfluthrin: 5 % in dosage of 50 mg/m^2
  - Other insecticides used: Permethrin, Lambdacyhalothrin, Etofenprox, Cypermethrin
- *Effectiveness of pyrethroids[Q]:* for 6 – 12 months (Retreatment every 6 months)
  - *Long-lasting insecticidal mosquito nets (LLINs):* Also use pyrethroid insecticides, and a chemical binder that allows the nets to be washed > 20 times, allowing use for > 3 years
- *Household bed nets used for mosquito control:*
  - No. of holes per square inch > 150[Q]
  - Diameter of each hole < 0.0475 inch[Q]
- *Common insect repellents:*
  - DEET (N, N-diethyl-m-toluamide) (Most commonly used)
  - Allethrin
  - Essential oil of the lemon eucalyptus [p-menthane-3, 8-diol (PMD)]
  - Icaridin (picaridin)
  - Nepetalactone (catnip oil)
  - Citronella oil
  - Permethrin
  - Soyabean oil
  - Neem oil.

Types of Drug Resistance in Malaria[Q]

- *R1 resistance:* Recrudescence of infection between 7-28 days of treatment completion following initial resolution of symptoms and parasite clearance.
- *R2 resistance:* Patients with marked reduction of parasitemia (parasite count reduced by more than 75%) at 48 h but failed to clear parasites by day 7.
- *R3 resistance:* Patients whose parasitemia did not fall by more than 75% within 48 h or occasionally increased by day 7.

NVBDCP: LEISHMANIASIS

Introduction to Leishmaniasis

- *Leishmaniasis (Kala azar):* Is a group of protozoal diseases caused by Leishmania

Type of Leishmaniasis	Causative agent[Q]
Visceral Leishmaniasis	Leishmania donovani[Q]
Cutaneous/dermal Leishmaniasis	Leishmania tropica[Q]
Muco-cutaneous Leishmaniasis	Leishmania braziliensis

- *Kala azar is transmitted by[Q]:* Female Phlebotamus argentipes (Sandfly)
  - Sandfly cannot fly; it hops
  - Sandfly rests in cracks and crevices of walls[Q]
  - *Insecticide of choice:* DDT[Q]
    - 2 rounds of spray per year
    - Spray up to 6 feet height on walls
    - If DDT–resistant, use BHC
- Kala azar is known as 'Black Sickness'[Q]

I *Kala azar is transmitted by[Q]:* Female Phlebotamus argentipes (Sandfly).

Sandfly

- *Sandfly is the vector of:*[Q]
  - Visceral Leishmaniasis (Kala azar)
  - Cutaneous Leishmaniasis (Oriental Sore)

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- Sandfly Fever
- Oroya Fever

- Sandflies inject the infective stage, *metacyclic promastigotes*, during blood meals.

DDT

- DDT is Dichloro-Diphenyl-Trichloroethane
- Synthesized by: Othmar Zeidler[Q] (1874)
- Insecticidal properties discovered by: Swiss scientist Paul H. Müller[Q] (1939) [awarded the 1948 Nobel Prize in Physiology and Medicine[Q]]
- Positive association found with: Liver, biliary tract and breast cancers.

Tests for Leishmaniasis

- *Parasitological diagnosis:* LD bodies in aspirates of spleen, liver, bone marrow, lymph nodes, skin
- *Hematological diagnosis:* Progressive leucopenia, anemia, reversed albumin: globulin ratio (raised IgG)
- *Aldehyde Test of Napier:* Used earlier for diagnosis but is a better test for surveillance[Q]
  - Non-specific test
  - Demands use of venous blood
  - Detects raised globulins
  - False +ve in many chronic conditions where albumin: globulin ratio is reversed
- *Serological Tests:*
  - *rK-39 Dipstick test*[Q]*:* Is for Visceral Leishmaniasis (Kala Azar)
  - ELISA
  - IFAT
  - Direct Agglutination Test
- *Leishmanin (Montenegro) Test:* Test of immunity status[Q]
  - 0.1 ml (intradermal) washed promastigotes on forearm
  - Read after 48-72 hours[Q]
    Induration > 5 mm is +ve.

I

rK-39 Dipstick test[Q]*:* Is for Visceral Leishmaniasis (Kala Azar).

Treatment of Kala Azar[Q]

- *1st Line*[Q]*: Sodium stibogluconate* (i/v or i/m) 20 mg/kg × 20 days (antimonial compounds)
- 2nd Line: *Pentamidine* (i/v) 3 mg/kg × 10 days
- 3rd Line: *Amphotericin-B* (i/v) 1 mg/kg × 20 days (now considered as treatment of choice in many countries[Q])
- *Other drugs:*
  - Ketoconazole
  - Allopurinol
  - Paramomycin
  - Mepacrine (for dermal leishmaniasis)
  - New Wonder Drug: Miltefosine (oral) 2.5 mg OD × 4 weeks [Is now second line treatment).

NATIONAL HEALTH MISSION

- *Launched*: 2013
- *Composition*: NRHM + NUHM
- *Goals of NHM*: (According to XII FYP 2012-17)
  - Reduce MMR to 1/1000 live births
  - Reduce IMR to 25/1000 live births
  - Reduce TFR to 2.1
  - Prevention and reduction of anaemia in women aged 15–49 years

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- Prevent and reduce mortality & morbidity from communicable, non-communicable; injuries and emerging diseases
- Reduce household out-of-pocket expenditure on total health care expenditure
- Reduce annual incidence and mortality from Tuberculosis by half
- Reduce prevalence of Leprosy to <1/10000 population and incidence to zero in all districts
- Annual Malaria Incidence to be <1/1000
- Less than 1 per cent microfilaria prevalence in all districts
- Kala-azar Elimination by 2015, <1 case per 10000 population in all blocks

NATIONAL RURAL HEALTH MISSION (NRHM)

Core Strategies of National Rural Health Mission (NRHM)

- Train and enhance capacity of Panchayati Raj Institutions (PRIs)
- Promote access to improved healthcare at household level (ASHA recruitment and training[Q])
- Health Plan for each village through Village Health Committee
- Strengthening sub-centre through an untied fund
- Strengthening existing PHCs and CHCs, and provision of 30-50 bedded CHC per lakh population (Indian public Health standards: IPHS[Q])
- Preparation and Implementation of an inter-sectoral District Health Missions
- Strengthening capacities for data collection, assessment and review for evidence based planning , monitoring and supervision.
- Formulation of transparent policies for development of human resources
- Developing capacities for preventive health care at all levels.
- Janani Suraksha Yojana (JSY) is a safe motherhood intervention under NRHM being implemented with by promoting institutional delivery amount the poor pregnant women[Q]
- Promoting non- profit sector particularly in under served areas.

Key Strategies of NRHM

- *National Rural Health Mission (NRHM) 2005–12:* Provide every village in the country with a trained female community health activist – ASHA (Accredited Social Health Activist)[Q]
- Develop 'Health Plan (VHP) for each village' through Village Health Samiti of Panchayat (PHS).
  - *ASHA will make VHPQ:* ASHA along with ANM, Aanganwadi Workers and community workers under the leadership of PHS
- *'Intersectoral District Health Plan (DHP)'*, prepared by District Health Mission (DHM) including drinking water, sanitation, hygiene and nutrition
  - Core unit of planning, budgeting and implementation: District[Q]

Accredited Social Health Activist (ASHA)

- *Proposed population norm:* 2 ASHA worker per 1000 population[Q]
- *ASHA is expected to act as,*
  - *Interface between:* Community and Health care system[Q]
  - *Bridge between:* ANM and village[Q]
  - *Accountable to:* Panchayat[Q]
- *Selection criteria of ASHA:*
  - Woman resident of local community
  - Preferably 25 – 45 years age
  - Literate with formal education up to VIII class[Q]

I *Norm*: 2 ASHA worker per 1000 population.

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I Literate with formal education up to VIII class.

I *Resource person for training of ASHA:* ANM and Anganwadi worker[Q].

I Janani Suraksha Yojana (JSY) Launched on 12th April 2005[Q] Is modification of National Maternity Benefit Scheme[Q].

- *Responsibilities of ASHA[Q]:*
  - Create awareness on health and its social determinants and mobilize the community towards local health planning and increased utilization and accountability of the existing health services
  - Promote good health practices and provide a minimum package of curative care as appropriate and feasible and make timely referrals
  - Provide information on determinants of health, on existing health services and the need for timely utilization of services
  - Counsel women on aspects of reproductive and child health
  - Mobilise the community and facilitate them in accessing health and health related services provided by the government
  - Act as a depot holder for essential provisions like ORS, IFA tablets, chloroquine, disposable delivery kits, oral pills & condoms[Q]
  - Provide primary medical care and act as DOTS provider[Q]
  - Help develop a comprehensive village health plan[Q]
  - Arrange escort/accompany pregnant women and children requiring treatment/admission to nearest health facility[Q]
  - Be a part of JSY (Janani Suraksha Yojana) and help reduce MMR[Q]
- *Resource person for training of ASHA:* ANM and Anganwadi worker[Q]
- *Other roles of Anganwadi worker integrated with ASHA:*
  - Organisation of Health-day
  - IEC activities
  - Depot holder and issuing to ASHA
  - Update list of eligible couples and children
  - Mobilisation for food supplementation
- *Other roles of ANM worker integrated with ASHA:*
  - Organise meetings with ASHA
  - Participate and guide for organising Health-day
  - Updating eligible couple register
  - Motivating pregnant females for antenatal care
  - Educating ASHA for danger signals of pregnancy
  - Orient ASHA on OCPs.

Indicators for Monitoring and Evaluation of ASHA's Work

- *Process indicators:*
  - No. of ASHAs selected
  - No. of ASHAs trained
  - % ASHAs attending review meeting after 1 year
- *Outcome indicators:*
  - % newborns weighed and families counseled
  - % deliveries with skilled assistance
  - % institutional deliveries
  - % JSY claims made to ASHA
  - Completed immunized 12-23 months age group
  - % unmet need in BPL
  - % fever cases received chloroquine within 1 weeks in endemic area
- *Impact indicators[Q]:*
  - Infant mortality rate (IMR)
  - Child malnutrition rates
  - No. of cases of TB/Leprosy detected as compared to last year.

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ASHA Kits-composition

Drug Kit	Equipment Kit
• DDK for Clean deliveries at home • Tab. Paracetamol • Paracetamol syrup • Tab. Iron Folic Acid (L) • Tab. Punarvadu Mandur (ISM Preparation of Iron) • Tab. Dicyclomine • Tetracycline ointment • Zinc Tablets • Povidone Ointment Tube • G.V. Paint • Cotrimoxazole syrup • Pediatric Cotrimoxazole tablets • ORS Packets • Condoms • Oral pills (In cycles) • Spirit • Soap • Sterilized Cotton • Bandages, 4 cm × 4 meters • Nischay Kit • Rapid Diagnostic Kit • Slides for Malaria & Lancets • Emergency Contraceptive Pill • Sanitary napkins*	• Digital Wrist Watch • Thermometer • Weighing Scale (for newborn) • Baby Blanket • Baby Feeding spoon • Kit Bag • Communication Kit • Mucous Extractor

(* Menstrual Hygiene amongst adolescent girls)

Janani Suraksha Yojana (JSY)

- Launched on 12th April 2005[Q]
- Is modification of National Maternity Benefit Scheme[Q]
- *Objectives of JSY:* Reduction of maternal mortality and infant mortality[Q] (through institutional deliveries and care especially for poor women)
- *Salient features of JSY:*
  - Is 100% centrally sponsored[Q]
  - Combines 'benefit of cash assistance with institutional care'[Q]
  - Eligibility of cash assistance.
    - In low performing states (LPS): All women undergoing institutional deliveries
    - In high performing states (HPS): Below poverty linewomen aged 19 years and above and SC/ST pregnant women
  - Limitation of cash assistance:
    - In low performing states (LPS): All births in institutions
    - In high performing states (HPS): Up to 2 live births
- *JSY package:* [New guidelines][Q]

Category	Rural areas			Urban areas		
	Mother's package	ASHA's package	Total package	Mother's package	ASHA's package	Total package
LPS	1400	600	2000	1000	200	1200
HPS	700	200	900	600	200	800

(*LPS:* Low performing states; HPS: High performing states)

National Rural Health Mission (NRHM)

- *New Initiatives:*
  - Home delivery of contraceptives by ASHA
  - District level household survey (DLHS-4) in 26 states/UTs
  - Promotion of Menstrual hygiene in 152 districts
  - Differential financial approach

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- ASHA involvement in Home based newborn care (HBNC)
- Performance based funds allocation to states
- Village Health, Sanitation and Nutrition Committee (VHSNC)
- Mainstreaming of AYUSH

Janani-Shishu Suraksha Karyakram (JSSK)

- *Pregnant women components:*
  - Free deliveries (including caesarean section) in public health institutions
  - Free drugs and consumables
  - Free diet (Normal delivery: 3 days; Caesarean section: 7 days)
  - Free diagnostics
  - Free blood transfusion (whenever required)
  - Free transport from home to institution
- *Child health components:*
  - *Nutritional rehabilitation centres (NRCs)*: Inpatient treatment of severely malnourished children and counselling of mothers on proper feeding
  - *Integrated management of neonatal and childhood illnesses (IMNCI)*: Management of common childhood illnesses
  - *Pre-service IMNCI*: Included in medical curriculum to generate trained IMNCI manpower
  - *Facility based IMNCI (F-IMNCI)*: Focus on inpatient management of major causes of neonatal and childhood mortality, viz. asphyxia, sepsis, low birth weight, pneumonia, diarrhoea, malaria, meningitis and severe malnutrition
  - *Facility based newborn care*:

Health facility	All newborns at birth	Sick newborns
MCH level I: PHC, Subcentre	Newborn care corner (NBCC) in labour room	Prompt referral
MCH level II: CHC, First referral unit (FRU)	NBCC in labour room and operation theatre	Newborn stabilization unit (NBSU)
MCH level III: District hospital	NBCC in labour room and operation theatre	Special newborn care unit (SNCU)

  - *Newborn care corner (NBCC)*: Space within delivery room for immediate care to newborns mandatory for all health facilities
  - *Newborn stabilization unit (NBSU)*: Facility within or near maternity ward where sick and low birth weight newborns can be cared for short periods
    - *Location:* CHCs, FRUs
    - *Space required:* 4 bedded unit and 2 beds for post-natal ward for rooming-in
  - *Special newborn care unit (SNCU)*: Neonatal unit near labour room to provide special care for sick newborns (EXCEPT assisted ventilation, major surgery)
    - *Location:* District hospitals, Sub-district hospitals having >3000 deliveries per year
    - *Space required:* 12 bedded unit and 4 additional beds for adult step-down
  - *Triage of sick newborns*:

Emergency signs	Priority signs	Non-urgent signs
Hypothermia (<36ºC) Apnoea, gasping Severe respiratory distress Central cyanosis Shock Coma, convulsions Encephalopathy	Cold stress Respiratory distress Irritable/ restless/ jittery Abdominal distension Severe jaundice Severe pallor Bleeding from other sites Major congenital malformation Wt <1.8 or >4.0 kg	Transitional stools Possetting Minor birth trauma Superficial infections Minor malformations Jaundice All other cases
Initiate emergency treatment	*Assess and act rapidly*	*Assess and counsel*

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- *Home-based newborn care (HBNC)*:
  - *Main person involved:* ASHA
  - *Other health personnel involved:* ANM, Anganwadi worker, Medical officer
  - *ASHA 6 visits in Institutional deliveries:* Day 3, 7, 14, 21, 28, 42
  - *ASHA 7 visits in Home based deliveries:* Day 1, 3, 7, 14, 21, 28, 42
  - *Other functions of ASHA (Paid ₹ 250/-):*
    - Record birth weight
    - BCG, OPV, DPT to newborn
    - Birth registration
    - Mother/newborn safety till 42nd day

Navjat-Shishu Suraksha Karyakram (NSSK)

- *Main objective:* To train health personnel in basic newborn care and resuscitation

Rashtriya Bal Swasthya Karyakram (RBSK) 2013Q

- *Importance*: Child Health Screening and Early Intervention Services Programme under National Rural Health MissionQ
- *Target group*Q:
  - 0-6 years old children (Rural areas + Urban slums)
  - 6-18 years old children (Enrolled in government schools)
- *Targeted diseases (**4D's**)* Q:
  - Defects at birth
  - Diseases in children
  - Deficiency conditions
  - Developmental delays including disabilities
- *Selected 34 diseases under RBSK*:

Defects at birth	**Deficiency conditions**
Neural tube defects Down's syndrome Cleft lip/ palate Talipes Dysplasia of hip Congenital cataract Congenital deafness Congenital heart disease Retinopathy of prematurity	Anemia (especially severe) Vitamin A deficiency (Bitot spots) Vitamin D deficiency (Rickets) Severe acute malnutrition Goitre
Diseases in children	**Developmental delays including disabilities**
Skin conditions (Eczema, Fungal, Scabies) Otitis media Rheumatic heart disease Reactive airway disease Dental conditions Convulsive disorders	Vision impairment Hearing impairment Neuro-motor impairment Motor delay Cognitive delay Language delay Behaviour disorder (Autism) Learning disorder Attention deficit hyperactivity disorder
Congenital hypothyroidism, Sickle cell anemia, Beta thalassemia	

- *Suggested composition of Mobile health team*:
  - 2 AYUSH Medical officers (1 male, 1 female)
  - 1 ANM/ Staff nurse
  - Pharmacist

Rashtriya Kishor Swasthya Karyakram (RKSK) 2014

- Importance: India's First comprehensive adolescent health programme

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- Target Group: Adolescents 10-19 years age (243 million; 21% of Indian population) in Urban and rural areas
  - Girls and Boys
  - Married and Unmarried
  - Poor and Affluent
  - School and Out of school
- Strategy[Q]: RMNCH+A (Reproductive, Maternal, New born, Child Health + Adolescent)

7 Critical Components (7C's)[Q]	6 Strategic Priorities
Coverage Content Communities Clinics Counselling Communication Convergence	Nutrition Sexual and reproductive health (SRH) Non-communicable diseases (NCDs) Substance misuse Injuries & violence (+ gender-based violence) Mental health

National Urban Health Mission 2013

- *Description*: Subcomponent of National Health Mission (NHM), other component being NRHM
- *Coverage*[Q]: All state capitals, district headquarters and other cities/towns with a population of 50,000 and above (Cities and towns <50,000 population covered by NRHM)
- *Main aim*: To improve the health status of urban population particularly slum dwellers and other vulnerable sections by facilitating their access to quality health care
- *Expected outcomes of the programme*[Q]:
  - Reducing IMR in urban areas by 40% to 20 per 1000
  - Reduce MMR in urban areas by 50% to 1 per 1000
  - Achieve universal access to reproductive health including 100% institutional delivery
  - Achieve Total Fertility Rate of 2.1
  - Achieve all targets of Disease Control Programmes
- *Key components of NUHM*[Q]:
  - U-PHC (Urban - Primary Health Centre):
    1. 1 per 50,000 population (near or within a slum)[Q]
    2. OPD (consultation), basic lab diagnosis, drug/ contraceptive dispensing and delivery of RCH services, as well as preventive and promotive aspects of all diseases
  - U-CHC (Urban - Community Health Centre):
    1. 30-50 bedded U-CHC providing inpatient care in cities (>1 per 500,000 population)[Q]
    2. 75-100 bedded U-CHC facilities in metros
  - Subcentres: NOT ESTABLISHED in NUHM[Q]
    1. Outreach services will be provided through Female Health Workers (FHWs)/Auxiliary Nursing Midwives (ANMs) headquartered at the UPHCs
  - USHA (Urban Social Health Activist): 1 per 1000-2500 population[Q]

NATIONAL LEPROSY ELIMINATION PROGRAMME (NLEP)

Multidrug Therapy (MDT)

Refer to Chapter 5, Theory

- *Drugs used in treatment of leprosy (Multi-Drug Therapy – MDT)*[Q]*:*
  - *Rifampicin:* Bactericidal drug kills 99.9% organisms (600 mg dose)
  - *Clofazimine:* Bacteriostatic drug most active on daily administration
  - *Dapsone:* Safe drug in dose up to 100 mg

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- *Other drugs effective in treatment of leprosy:*
  - Thioamides: Ethionamide & Prothionamide
  - Fluoroquinolones
  - Minocycline
  - Macrolides
- *Treatment of Single Skin Lesion (SSL) of Leprosy:*
  - *Previously:* ROM therapy
    - Rifampicin 600 mg
    - Ofloxacin 400 mg
    - Minocycline 100 mg
  - *Currently:* 6 month treatment as for Paucibacillary (PBL) Leprosy (Rifampicin and dapsone for 6 months)Q.

Lepra Reactions

- *Lepra Reactions:* Is an inflammation that can affect skin patches, nerves, eyes and in few case, internal organs
- They can occur anytime in a leprosy patient:
  - Before diagnosis
  - At time of diagnosis
  - During treatment
  - After treatment has finished
- *Types of Lepra Reactions*Q*:*

Type I Lepra reactions Reversal reactions	Type II Lepra reactions Erythema Nodosum Leprosum (ENL)
More common in Borderline leprosyQ	More common in LL and BL leprosyQ
Reddish & swollen skin lesions Painful, tender, swollen nerves Signs of nerve damage Fever & malaise Swollen hands & feet New skin lesions (rare)	Tender, reddish & transient skin nodules Occasionally painful & swollen nerves Fever, joint pains & malaise Eye involvement

- *Treatment of Lepra Reactions:*
  - *Type I (Reversal) Reactions:* Prednisolone (steroidQ)
  - *Type II (ENL) Reactions:*
    - *Mild cases:* Analgesics or anti-pyretics like aspirin
    - *Severe cases:* Prednisolone (steroidQ)
    - *During steroid withdrawal:* Clofazimine
- *Reversal Reaction Versus Relapse:*

	Reversal Reaction	Relapse
Time interval	During treatment or within 6 months of stopping treatment	Generally after 6 months of stopping treatment
Onset	Abrupt & sudden	Slow & insidious
Old lesions	Edematous, erythematous, tender	Erythematous & infiltration
New Lesions	Several appear	Few appear
Ulcerations	May take place	Does not occur
Nerve involvement	Multiple nerves involved, painful & tender	Single nerve involved, non-painful & non-tender
General condition	Fever, joint pains, malaise	Not usually affected
Response to steroids	Rapid	Nil

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Infrastructure Norms under NLEP

- *SET Centre:* one per 20,000 – 25,000 population[Q]
- *Urban Leprosy Centre (ULC):* one per 50,000 population[Q]
- Leprosy Control Unit (LCU): one per 4-5 Lac population[Q].

Survey Education and Treatment (SET) Centre

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SET Centre: per 20,000 – 25,000 pollution.

- *A SET Centre is attached with:* PHC in rural area
- *Administrative control:* Medical Officer (PHC)
- *Population catered:* 20 – 25, 000
- *Staff:* One paramedical worker
- *Functions:*
  - Detection of cases early by house-to-house survey
  - Health education about leprosy
  - Free treatment of all cases and follow-up
  - Contact tracing and their chemoprophylaxis with Dapsone

Simplified Information System (SIS)

- *Description[Q]:* Is the Management and Information System (MIS) essential for the monitoring and evaluation of National Leprosy Eradication Programme (NLEP); It was started in 2002
- *Indicators of SIS (NLEP):*
  - Prevalence rate of leprosy
  - New case detection rate
  - Child proportion among new cases
  - Visible deformed case proportion among new cases
  - MBL (Multibacillary Leprosy) proportion among new cases
  - Female proportion among new cases
  - New case detection rate in Scheduled castes
  - New case detection rate in Scheduled tribes
  - Patient month blister calendar packs stock
  - Proportion of health subcentres providing MDT (Multidrug Therapy)
  - Absolute no. of patients made RFT (Released from treatment)

Newer Initiatives Under NLEP

- *Focussed Leprosy Elimination Plan (FLEP) 2005:*
  - Priority areas: Prevalence > 3 per 10,000
  - Increased efforts on IEC, training and integrated service delivery
  - Week long 'Block Leprosy Awareness Campaign'
- *SAPEL and LEC[Q]:*
  - Special Action Projects for Elimination of Leprosy (SAPEL) in Rural areas and Leprosy Elimination Campaigns (LEC) for Urban areas: To cover populations residing in difficult/inaccessible areas, which were not generally covered by regular programme activities.
- *Accompanied MDT[Q]:* If patient is unable to come to collect his/her MDT from clinic, any responsible person from family or village can collect it.
  - Designed to help patients who have to interrupt their treatment due to any avoidable reason
  - Especially useful for irregular patients
  - Gives patients a choice: Patients can collect entire MDT course when diagnosed after proper counselling.

New Set of Indicators in Leprosy Control[Q]

- *Operational Indicators:* Monitor functioning of control activities
  - No. of new cases detected
  - New cases with grade 2 disability per 100,000 population
  - Treatment completion/cure rate

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- *Case detection indicators*
  - % of children (0-14 yrs) among new detected cases: A high prevalence of infection among children indicate that Leprosy is a active and spreading
  - % of females among new detected cases
  - % of Multi-bacillary cases on regular treatment
  - % of new cases with grade 2 disability
- *Quality of service indicators*
  - New cases % correctly diagnosed
  - No. of relapses
  - % treatment defaulters
  - % patients who develop new disability during MDT
- *Epidemiological indicators:* Evaluate effectiveness of programme[Q]
  - *Incidence*
    - Most sensitive index of transmission[Q]
    - Only index for measuring effectiveness of measures taken[Q]
  - *Prevalence*
    - 'Is Measure of case load'[Q]
    - Is useful in planning treatment services[Q]

I
Incidence of Leprosy
- Most sensitive index of transmission

National Leprosy Elimination Programme (NLEP) 2012-2017 Strategy

- Objectives:
  - Elimination of leprosy (Prevalence < 1 case per 10,000 population) in all districts
  - Strengthen Disability Prevention & Medical Rehabilitation of persons affected
  - Reduction in the level of stigma associated with leprosy
- Targets:
  - Prevalence Rate (PR) < 1/10,000: 100% by 2017
  - Annual New Case Detection Rate (ANCDR) <10/100,000: 100% by 2017
  - Cure rate Multibacillary leprosy cases (MB): >95%
  - Cure rate Paucibacillary leprosy Cases (PB): >97%
  - Grade II disability rate in % of New cases: 35% reduction (2 per Million population)
  - Stigma reduction: 50% Reduction over the percentage reported by NSS

NATIONAL PROGRAMME FOR PREVENTION AND CONTROL OF DEAFNESS

NPPCD

- *Long term objective:* To reduce disease burden by 25% by end of XI Five Year Plan[Q]
- *Immediate objectives:*
  - To prevent avoidable hearing loss due to disease or injury
  - Early identification, diagnosis and treatment of ear problems responsible for hearing loss and deafness
  - To medically rehabilitate deaf persons of all age groups
  - To strengthen the existing inter-sectoral linkages for continuity of the rehabilitation programme, for deaf
  - To develop institutional capacity for ear care services by providing equipment, material and training personnel
- *Pilot project:* In first phase of implementation in 25 districts.

NATIONAL IODINE DEFICIENCY DISORDERS CONTROL PROGRAMME (NIDDCP)

NIDDCP

- National Goitre Control Programme (NGCP) launched in 1962 (100% centrally sponsored)
- National Iodine Deficiency Disorders Control Programme (NIDDCP) was launched in 1992.

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Indicators to Monitor Success of NIDDCP

- *Process Indicators:* Indicators to monitor and evaluate the salt iodization process
  - Salt iodine content at the production site
  - Salt iodine content at point of packaging
  - Salt iodine content at wholesale and retail levels
  - Salt iodine content in households
- *Impact Indicators:* Indicators to assess baseline (Iodine Deficiency Disorders) IDD status and to monitor and evaluate the impact of salt iodization on the target population
  - *Urinary Iodine Levels:* The *'principal impact indicator'*[Q] recommended once a salt iodization programme has been initiated (changes in goitre prevalence lag behind changes in iodine status and therefore cannot be relied upon to reflect accurately current iodine intake, although they may be useful in following trends)
  - *Goitre assessment:* (by palpation or by ultrasound) should remain a component of surveys to establish the baseline severity of IDD
  - *Neonatal thyroid stimulating hormone (TSH) levels:* may also play a role here if a country already has in place a screening programme for hypothyroidism
- *Sustainability Indicators:* Indicators to assess whether iodine deficiency has been successfully eliminated and to judge whether achievements can be sustained and maintained for the decades to come
  - Median urinary iodine levels in the target population
  - Availability of adequately iodized salt at the household level
  - Set of programmatic indicators (as evidence of sustainability).

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Urinary Iodine Levels: The 'principal impact indicator'.

Important Points Regarding NIDDCP

- *Indicators for epidemiological assessment of iodine deficiency:*
  - Prevalence of goitre
  - Prevalence of cretinism
  - Urinary iodine excretion
  - Measurement of thyroid function (T4, TSH)
  - Prevalence of neonatal hypothyroidism
  - One-third of world population is exposed to the risk of IDD
- *Iodine deficiency as a major public health problem*[Q]*:* Goitre prevalence > 10%
- *Daily requirement of Iodine*[Q]*:* 150 mcg (<1 teaspoon over lifetime[Q]) supplied normally by well balanced diets and drinking water
- *WHO/UNICEF/ICCIDD recommended daily iodine intake:*

Group	Recommended daily intake
Preschool children (0 – 59 months)	90 mcg
School children (6 – 12 years)	120 mcg
Adults (>12 years)	150 mcg[Q]
Pregnancy and lactation	250 mcg

- *Iodised Oil:*
  - *Intramuscular Iodised Oil (poppy-seed oil):* Average dose 1 ml injection provided protection for 4 years[Q].
  - *Oral Iodised Oil:* 2 ml dose is effective for 2 years.
- *Most widely used prophylactic public health measure against endemic goiter:* Iodised salt[Q]
  - Iodised salt is most convenient, effective and economical method of mass prophylaxis in endemic areas.
- *Standards of Iodised salt (Level of Iodization in salt):*[Q]
  - At production level: 30 ppm
  - At consumer level: 15 ppm

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Daily requirement of Iodine[Q]*:* 150 mcg.

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Standards of Iodised salt (Level of Iodization in salt):[Q]
- At production level: 30 ppm
- At consumer level: 15 ppm.

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- *Two-in-one salt:* National Institute of Nutrition (Hyderabad) developed *'Twin Fortified Salt'* also known as *'Double Fortified Salt' (DFS)*[Q]
  - *DFS contains* salt, potassium iodate, ferrous sulphate and sodium hexa meta phosphate (It contains Iron and Iodine)
  - *DFS provides* 40 mcg Iodine and 1 mg Iron per gram of salt[Q].
- *DEC Medicated Salt:* is used for mass treatment of Filariasis; Treatment should be continued for 6 – 9 months
  - 1-4 gm DEC (diethylcarbamazine) per kg salt[Q]
- *In areas with mild-moderate iodine deficiency:* IQ of school children is lower by 13 points average
- *Global Iodine Deficiency Disorders (IDD) Day:* 21st October[Q]
- *Criteria for tracking progress towards IDD elimination[Q]:*

Indicator	Goal
Proportion with enlarged thyroid (age 6 – 12 years)	< 5 %
Urinary Iodine Excretion below 100 mcg/litre	< 50 %
Urinary Iodine Excretion below 50 mcg/litre	< 20 %
Proportion of houses consuming adequately iodised salt	> 90 %

NATIONAL PROGRAMME FOR PREVENTION AND CONTROL OF CANCER, DIABETES, CARDIOVASCULAR DISEASES AND STROKE (NPCDCS)

- *Introduction:*
  - Single centre for Cancer, Diabetes, Cardiovascular disease, Stroke[Q]
  - 100 districts in 21 states being covered in 11th Five year plan[Q]
  - 20,000 Subcentres and 700 Community health centres (CHCs) covered
- *Activities at Sub-centres[Q]:*
  - Health promotion for behaviour and lifestyle change
  - Opportunistic screening of BP, Blood glucose (Strip method) in age >30 years
  - Referral to CHC of cases of DM, HT
- *Activities at CHCs:*
  - Diagnosis and management at NCD clinic
  - Home visits by nurse for bedridden cases
  - Referral to District hospital for complicated cases
- *Activities at District hospital[Q]:*
  - Health promotion
  - Screening of population >30 years
  - Diagnosis and management of cardiovascular diseases
  - Home-based palliative care for chronic, debilitating, progressive patients
- *Urban health check-up scheme for Diabetes and High BP:*
  - Screen urban slum population
  - Screen population >30 years and pregnant females
- *Cancer control in NPCDCS:*
  - Regional cancer control scheme: Regional cancer centres to act as Referrral centres for complicated cases
  - Oncology wing development scheme
  - Decentralized NGO scheme: IEC activities and early cancer detection
  - IEC at Central level
  - Research and training

COMMUNITY BASED UNIVERSAL HEALTH INSURANCE SCHEME (UHIS)

- *Launched in India:* in 2003–04 for BPL (Below Poverty Line) population
- *Age limit:* 3 months – 65 years

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- *Premium Payable (Post Subsidy):*
  - *For an individual:* ₹165/-per annum
  - *For a family up to 5 members:* ₹248/- per annum
  - *For a family up to 7 members:* ₹330/- per annum
- *Subsidy given in premiums:*
  - *For an individual:* ₹200/-per annum
  - *For a family up to 5 members:* ₹300/- per annum
  - *For a family up to 7 members:* ₹400/- per annum
- *Scope of cover:*
  - *Medical reimbursement:* Hospitalization expenses up to ₹30,000/- to an individual/family
  - *Personal Accident Cover:* Coverage for Death of the Earning Head of the family due to accident is ₹25,000/–
  - *Disability Cover:* If the earning head of the family is hospitalized due to an accident/illness a compensation of ₹50- per day will be paid per day of hospitalization up to a maximum of 15 days after a waiting period of 3 days.
- *Main Exclusions:*
  - All pre-existing diseases, and diseases contracted during the first 30 days from the commencement date of the policy.
  - Some diseases such as Cataract, Benign Prostatic Hypertrophy, Hysterectomy, Hernia, Hydrocele, Piles, Sinusitis, Congenital Internal Disease are not covered in the first year of the policy.
  - Corrective, cosmetic or aesthetic dental surgery or treatment.
  - Cost of spectacles, contact lens and hearing aid.

RASHTRIYA SWASTHYA BIMA YOJANA (RSBY)

- *Synonym:* National Health Insurance Scheme (NHIS)
- *Beneficiaries:* Below poverty line families[Q]
- *Contribution:*
  - *Central government:* INR 600/- (75% of total)
  - *State Government:* INR 200 (25% of total)
  - *BPL family:* INR 30/- (One time payment)[Q]
- *Benefits:*[Q]
  - Inpatient medical cover per family per year: INR 30,000/-
  - Cover in case of death of afamily member: INR 25,000/-

PRADHAN MANTRI JAN DHAN YOJANA (PMJDY) 2014[Q]

- *Launched*: 15th August, 2014
- *Description*: "National Mission for Financial Inclusion "to ensure access to financial services, namely, Banking/ Savings & Deposit Accounts, Remittance Credit, Insurance, Pension in an affordable manner.
- *Objectives*:
  - To ensure access to various financial services like availability of basic savings bank account, access to need based credit, remittances facility, insurance and pension to excluded sections (weaker sections & low income groups)
  - Effective use of technology to allow deep penetration at affordable cost
- *Phases of PMDJY*:
  - Phase I: 15 August 2014-14 August 2015
  - Phase II: 15 August 2015-14 August 2018
- *Mission mode objectives (6 Pillars)*:
  - Universal access to banking facilities
  - Providing basic banking accounts (overdraft facility, RuPay Debit card to all households)

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- Financial Literacy Programme
- Creation of Credit Guarantee Fund
- Microinsurance
- Unorganized sector Pension schemes

PRADHAN MANTRI SWASTHYA SURAKSHA YOJANA (PMSSY) 2006[Q]

- *Importance*: Aims at correcting the imbalances in the availability of affordable healthcare facilities in the different parts of the country in general, and augmenting facilities for quality medical education in the under-served States in particular
- *Components of first phase*:
  - Setting up 6 AIIMS institutions at Bhopal, Bhubaneswar, Jodhpur, Patna, Raipur and Rishikesh
  - Upgradation of 13 existing medical institutions at Jammu, Srinagar, Kolkata, Lucknow, Varanasi, Hyderbad, Tirupati, Salem, Ranchi, Ahmedabad, Bangalore, Mumbai, Thiruvananthapuram
- *Components of Second phase*:
  - Setting up 2 AIIMS institutions at Rae bareli, Raigunj (Dinajpur)
  - Upgradation of 6 medical institutions at Rohtak, Tanda, Amritsar, Nagpur, Madurai, Aligarh
- *Components of Third phase*:
  - Upgradation of 39 more medical institutions

NATIONAL HEALTH POLICY (NHP) 2015

Goal: The attainment of the highest possible level of good health and well-being, through a preventive and promotive health care orientation in all developmental policies, and universal access to good quality health care services without anyone having to face financial hardship as a consequence.

Key Policy Principles

- Equity
- Universality
- Patient Centered & Quality of Care
- Inclusive Partnerships
- Pluralism
- Subsidiarity
- Accountability
- Professionalism, Integrity and Ethics
- Learning and Adaptive System
- Affordability

Key Targets/ Priority Areas

- "Health In All" approach[Q] as complement to Health For All.
- 7 Priority Action Areas[Q]: Swachh Bharat Abhiyan, Balanced and Healthy Diets, Nasha Mukti Abhiyan , Yatri Suraksha to ensure road and rail safety, Nirbhaya Nari for action against gender violence, Reduced stress and improved safety in the work place, Reducing indoor and outdoor air pollution
- Swasth Nagrik Abhiyan a social movement for health
- Public health expenditure: ≥ 2.5% of the GDP[Q]
- Population to bed ratio: ≥ 1000 beds per million population (1 per 1000)[Q]
- NUHM to cover all State capitals, District headquarters and Cities/towns with more than 50,000 populations[Q]

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- Single digit Neonatal mortality and Stillbirth rates
- Increase the proportion of male sterilization from < 5% where it is currently, to ≥ 30%[Q]
- Leprosy: Reduction to grade 2 disability to < 1 per million by 2020[Q]
- Life support ambulances linked to trauma management centers
  - 1 per 30 lakh population (Urban)
  - 1 per 10 lakh population (Rural)
- A nursing school in every large district/cluster of districts of about 20-30 lakh population
- A Common Entrance Exam on the pattern of NEET for UG entrance at All India level needs to be enforced. A Licentiate Exam will be introduced for all medical graduates with a regular renewal at periodic intervals with CME credits accrued. All Indian students studying medicine abroad should undertake a screening test to obtain registration with the regulatory body and the same should be applicable for Indian colleges as well to ensure the quality of medical graduates
- A robust National Health Accounts System needs to be operationalised

NATIONAL POPULATION POLICY 2000 (NPP 2000)

- *Immediate objective:* To address the unmet needs for contraception, health care infrastructure, and health personnel, and to provide integrated service delivery for basic reproductive and child health care
- *Mid-term objective:* To bring the TFR to replacement levels (TFR = 2.1) by 2010[Q]
- *Long term objective:* To achieve a stable population by 2045[Q]
- *National Socio-demographic goals for 2010:*
  - Address the unmet needs for basic reproductive and child health services, supplies and infrastructure
  - Make school education up to age 14 free and compulsory, and reduce drop outs at primary and secondary school levels to <20% for both boys and girls
  - Reduce IMR to < 30 per 1000 live births[Q]
  - Reduce MMR to < 100 per 100,000 live births[Q]
  - Achieve universal immunization of children against all VPDs
  - Promote delayed marriage for girls (not <18y and preferably >20y[Q]).
  - Achieve 80% institutional deliveries and 100% by trained persons[Q]
  - Achieve universal access to information/counseling, and services for fertility regulation and contraception with a wide basket of choices
  - Achieve 100% registration of births, deaths, marriage & pregnancy[Q]
  - Contain the spread of AIDS, and promote greater integration between the management of RTI and STI and the NACO
  - Prevent and control communicable diseases
  - Integrate Indian Systems of Medicine (ISM) in RCH services
  - Promote vigorously the small family norm to achieve replacement levels of TFR (i.e., TFR = 2.1[Q])
  - Bring about convergence in implementation of related social sector programmes so that family welfare becomes people centred programme.

NATIONAL MENTAL HEALTH POLICY 2014

- *Vision*: Promote mental health, prevent mental illness, enable recovery from mental illness and ensure accessible & affordable quality health and social care
- *Goals*[Q]:
  - To reduce distress, disability, exclusion morbidity and premature mortality associated with MH disorders
  - To enhance understanding of MH in country
  - To strengthen leadership in MH at district, state and national levels

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Values and principles:	Objectives[Q]:
Equity	To provide universal access to MH care
Justice	To increase access to MH services for vulnerable groups
Integrated care	To reduce prevalence & impact of risk factors
Evidence based care	To reduce risk & incidence of suicide
Quality	To ensure respect for right of persons with MH disorders
Participatory and rights based approach	To reduce associated stigma
Governance and effective delivery	To enhance availability & equity of human resources
Value base in teaching & training programmes	To enhance financial allocation and improve utilization
Holistic approach to mental health	To identify social, biological & behavioral determinants

INTEGRATED CHILD PROTECTION SCHEME (ICPS 2009-10)

- Beneficiaries: Children in need of care and protection, Children in conflict, Children in contact with law, Children of migrant families, Children of prisoners/prostitutes, Working children, Street children, Trafficked children, Sexually-exploited children, Child drug abusers, Child beggars
- Objectives of ICPS: [**Mnemonic: S**uch **I**mportant **R**elease **E**merged **R**esponsibly]
  - **S**tructures establishment at all government levels for children in difficult circumstances
  - **I**mprove access to and quality of CPS
  - **R**aise public awareness about rights of children
  - **E**vidence based monitoring and evaluation system
  - **R**esponsibility and accountability of child protection articulated
- Services under ICPS: [**Mnemonic: Emergency WINGS**]
  - **Emergency** outreach service (Helpline 1098: 24-hour)
  - **W**eb-enabled child protection management system
  - **I**nstitutional services (Shelter home, Child home, Observation home)
  - **N**on-institutional family-based care (sponsors, adoption, foster-care, cradle-baby centres, after care)
  - **G**eneral grant-in-aid for need based interventions
  - **S**helters (open) for children in need in urban, semi-urban areas

SOME IMPORTANT HEALTH LEGISLATIONS PASSED IN INDIA

- The Quarantine Act, 1870[Q]
- The Vaccination Act, 1880
- The Child Marriage Restraint (SARDA) Act, 1929[Q]
- The Employees State Insurance (ESI) Act, 1948[Q]
- The Factories Act, 1948[Q]
- The Prevention of Food Adulteration (PFA) Act, 1954
- The Immoral Traffic (Prevention) Act, 1956
- The Indian Medical Council (Prof. Conduct and Ethics) Act 1956
- The Children's Act 1960
- The Dowry Prohibition Act, 1961
- The Maternity Benefit Act, 1961
- The Registration of Births and Deaths Act, 1969[Q]
- The Medical Termination of Pregnancy (MTP) Act, 1971[Q]
- The Narcotic Drugs and Psychotropic Substances Act, 1985[Q]
- The Consumer Protection Act (COPRA), 1986[Q]
- The Environmental Protection Act (EPA), 1986

I The Quarantine Act, 1870[Q].

I
- The Employees State Insurance (ESI) Act, 1948[Q].
- The Factories Act, 1948[Q].

I The Medical Termination of Pregnancy (MTP) Act, 1971[Q].

I The Transplantation of Human Organs Act, 1994[Q].

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- The Mental Health Act, 1987
- The Infant Milk Substitutes, Feeding Bottles and Infant Food (Regulation of production, supply and distribution) Act, 1992Q
- The Protection of Human Rights Act, 1993
- The Pre-conception and Pre-natal Diagnostic Techniques (Prohibition of Sex Selection) [PNDT] Act, 1994Q
- The Transplantation of Human Organs Act, 1994Q
- The Biomedical Waste (Management and Handling) Rules, 1998
- The National Rural Employment Guarantee Act (NREGA), 2005Q
- The Protection of Women from Domestic Violence Act, 2005Q
- The Right to Information (RTI) Act, 2005Q.

I The Right to Information (RTI) Act, 2005Q.

OT ACT, 1994

- *The Transplantation of Human Organs Act* was passed by Government of India in 1994.
  - It is an act to provide for the regulation of removal, storage and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs and for matters connected therewith or incidental thereto
- Any person 18 years age or more can authorize, any of his near relatives (spouse, son, daughter, father, mother, brother or sister), for removal of organs from his/her body after death (parents can authorize in case of minors)
- No donor and no person shall authorize the removal of any human organ for any purpose other than therapeutic purposes
- Before removal of body organs, atleast RMPs should certify *that life or brain-stem function have ceased*
- *Punishments under Organ Transplantation Act 1994*:
  - *New Modification in 2011:* Punishment for persons involved to be increased to up to 10 years imprisonmentQ + fine up to ₹ 20,00,000-1,00,00,000/-.

I Punishment for persons involved to be increased to up to 10 years imprisonmentQ.

CBD REGISTRATION ACT, 1969

- According to '*The Registration of Births & Deaths Act 1969*', both the births and deaths are to be registered within 21 days eachQ.

I Both the births and deaths are to be registered within 21 days eachQ.

Time of registration	Additional Requirements
Within 21 days	None
Delay < 30 days	Prescribed fee
Delay > 30 days & < 1 year	Late fee + affidavit from notary public
Delay > 1 year	Late fee + order from Class I officer/magistrate

NATIONAL RURAL EMPLOYMENT GUARANTEE ACT (NREGA) 2005

- NREGA Act 2005 has been passed by the Parliament to provide for *'100 days of guaranteed wage employment in every year'*Q to every household whose adult members volunteer to do *'unskilled manual work'*Q
- *Salient features:*
  - A household is entitled for *'100 days of work in a year'*Q
  - Rural Households to register to local gram panchayat. *'Job card'* to be given to every registered household (valid for 5 years)Q
  - Registered adult must submit an application to gram panchayat (for at least 14 days of continuous work)

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- One-third of persons who are given employment will be women. Allotment for work: *'within 15 days'*Q, else he/she shall be provided unemployment allowance
- The statutory minimum wage applicable to agricultural workers in the state is to be paid
- Work will be provided *'within 5 km'*Q of applicant's residence, else he/she is entitled to 10 per cent additional wages towards transport and living expenses
- Implementation of the Act: The *'gram sabha'* will identify works to be taken up. The *'panchayats'* have the principal responsibility for planning, implementation and monitoring
- All agencies implementing NREGA will be accountable to the public for their work. Social audit and Right to Information will apply to each aspect of implementation.

MCI ACT 1956

Professional Misconduct (Infamous Conducts) Under MCI ActQ

- Non-maintenance of medical records of patients (for 3 years) and refusal to provide the same within 72 hours when the patient makes a request
- Non-display the registration number of State Medical Council or the Medical Council of India in his clinic, prescriptions and certificates
- Committing adultery or improper conduct with a patient
- Conviction by Court of Law
- Sex Determination Tests
- Signing professional Certificates, Reports and other Documents which are untrue, misleading or improper
- Contravening the provisions of the Drugs and Cosmetics Act and regulations
- Performing or enabling unqualified person to perform an abortion or any illegal operation for which there is no medical, surgical or psychological indication
- Issuing certificates of efficiency in modern medicine to unqualified or non-medical person
- Contributing to the lay press articles and give interviews regarding diseases and treatments which may have the effect of advertising himself or soliciting practices
- Advertisements of institution run by a physician containing anything more than the name of the institution, type of patients, type of training, other facilities and the fees
- Using an unusually large sign board and write on it anything other than his name, qualifications, titles and name of his specialty, registration number or affixing a sign-board on a chemist's shop or in places where he does not reside or work.
- Disclosing the secrets of a patient, except:
  - in a court of law under orders of the Presiding Judge.
  - in circumstances where there is a serious and identified risk to a specific person and/or community.
  - notifiable diseases.
- Refusal on religious grounds alone to give assistance in or conduct of sterility, birth control, circumcision and medical termination of Pregnancy.
- Not taking written consent.
- Publishing photographs or case reports of patients without their permission.
- Using touts or agents for procuring patients.
- Claiming to be specialist unless he has a special qualification in that branch.
- Undertaking act of in-vitro fertilization or artificial insemination without the informed consent of the female patient and her spouse as well as the donor.
- Violating existing ICMR guidelines in clinical drug trials or other research involving patients or volunteers.
- Physician posted in rural area found absent on > 2 occasions during inspection by the Head of the District Health Authority or the Chairman, Zila Parishad.
- Physician posted in a medical college/institution both as teaching faculty or otherwise found absent on >2 occasions.

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THE NARCOTIC DRUGS AND PSYCHOTROPIC SUBSTANCES ACT, 1985

- *Whosoever produce, manufacture, buy, sell, produce, transport, use, consume any narcotic drug (Opium/poppy) or psychotropic substance:* Shall be punished with imprisonment 10-20 years[Q] + fine 1-2 lac rupees (5 years + 50000 rupees for Ganja).
  - Users, if not covered under Sections 15-25, will be sent for treatment/ rehabilitation and not punished[Q].
- *Breach in licence for opium growth:* Shall be punished with imprisonment 3 years with or without fine.
- *Whosoever possess a small quantity for personal consumption:* Shall be punished with imprisonment 6 months + fine.
  - *Subsequent offences:* Death penalty.
- *Alcohol use:* IS NOT covered by this act[Q].

POCSO Act (Prevention of Children from Sexual Offences Act) 2012

- *Child definition:* Any person less than 18 years of age
- *Includes:* Sexual abuses and pornography
- *Punishments under the act:*

Offences (Section)	Punishment (Section)
Penetrative sexual assault (3)	7 years-Life imprisonment + Fine (4)
Aggravated penetrative sexual assault (5)	10 years-Life imprisonment + Fine (6)
Sexual assault (7)	3-5 years + Fine (8)
Aggravated sexual assault (9)	5-7 years + Fine (10)
Sexual harassment (11)	3 years + Fine (12)
Use of child for pornography (13)	5 years + Fine (14)

FOOD STANDARDS AND SAFETY ACT (FSSA) 2006[Q]

- *Ministry In-charge*: Ministry of Health and Family Welfare
- *Objectives*:
  - To introduce a single statute relating to food
  - To provide for scientific development of the food processing industry
- *Organization constituted*: Food Standards and Safety Association of India (FSSAI) 2008

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MULTIPLE CHOICE QUESTIONS

REVISED NATIONAL TB CONTROL PROGRAMME

1. **A 25-year-old female has been diagnosed to be suffering from tuberculosis categorized as category I (sputum +ve) case of relapse. The new treatment regimen recommended under DOTS is:** *[AIIMS May 04]*
   (a) $2(HRZE)_3 + 5(HR)_3$
   (b) $2(HRSZE)_3 + 1(HRZE)_3 + 5(HRE)_3$
   (c) $3(HRZE)_3 + 2(HRE)_3 + 4(HR)_3$
   (d) $3(HRSZE)_3 + 1(HRZE)_3 + 6(HRE)_3$

2. **For sputum smear to come positive on ZN staining there should be minimum:** *[AIIMS Nov 1999]*
   (a) 100 bacilli per ml sputum
   (b) 1000 bacilli per ml sputum
   (c) 2000 bacilli per ml sputum
   (d) 10,000 bacilli per ml sputum

3. **A 26 years old male has symptoms suggestive of tuberculosis. At DOTS clinic, he undergoes 3 sputum smears examinations. Only one of the sputum smears turns out to be positive for AFB. Next step of management will be:** *[AIIMS Feb 1997]*
   (a) He is declared a Sputum smear +ve case; started with DOTS Cat I treatment
   (b) He is declared a Sputum smear –ve case; started with DOTS Cat III treatment
   (c) He is referred for Chest X-ray
   (d) He will undergo sputum smear examinations after 12 months again

4. **Which is the right number of doses of ATT for a category II patient under DOTS?** *[AIIMS Nov 04]*
   (a) IP – 24, CP – 54
   (b) IP – 36, CP - 66
   (c) IP – 24, CP - 48
   (d) IP – 36, CP - 54

5. **In RNTCP the schedule for sputum examination for category I patients is:** *[AIIMS May 02]*
   (a) 2, 3 and 5 months
   (b) 2, 4 and 6 months
   (c) 1, 3 and 5 months
   (d) 2, 5 and 7 months

6. **Best indicator of trend of Tuberculosis unaffected by current control measures is:** *[AIIMS Nov 1993]*
   (a) Annual Risk of Infection
   (b) Prevalence of TB infection
   (c) % of primary drug resistance
   (d) % of Multidrug resistance

7. **Multidrug resistance in TB is defined as resistance to:**
   (a) Streptomycin, Rifampicin and Isoniazid
   (b) Streptomycin and Rifampicin *[AIIMS May 2004]*
   (c) Isoniazid and Rifampicin
   (d) Streptomycin and Isoniazid

8. **Every TB sputum positive patient can infect up to:**
   (a) 1-2 persons per year *[AIIMS Dec 1995]*
   (b) 5-6 persons per year
   (c) 10-15 persons per year
   (d) 100-200 persons per year

9. **Under RNTCP, objective is to achieve:**
   (a) To achieve a cure rate of 70% and then to detect 85% of estimated cases *[AIIMS May 2001]*
   (b) To achieve a cure rate of 85% and then to detect 70 % of estimated cases
   (c) To detect 70% of estimated cases and then to achieve a cure rate of 85%
   (d) To detect 85% of estimated cases and then toachieve a cure rate of 70%

10. **To yield a positive sputum smear result on ZN Staining, there should be minimum of:** *[AIIMS Dec 1995]*
    (a) 100 acid fast bacilli per ml of sputum
    (b) 1000 acid fast bacilli per ml of sputum
    (c) 10000 acid fast bacilli per ml of sputum
    (d) 100000 acid fast bacilli per ml of sputum

11. **Only bacteriostatic anti-tubercular drug among the following is:** *[AIIMS Dec 1992]*
    (a) Isoniazid
    (b) Rifampicin
    (c) Streptomycin
    (d) Ethambutol

12. **Anti-tubercular drug contraindicated during pregnancy is:** *[AIIMS May 1994]*
    (a) Isoniazid (b) Rifampicin
    (c) Streptomycin (d) Ethambutol

13. **Ethambutol is associated with:** *[AIPGME 1996]*
    (a) Red-blue colour blindness
    (b) Red-green colour blindness
    (c) Blue-green colour blindness
    (d) Yellow-green colour blindness

14. **Anti-tubercular drug not given in children < 6 years age is:** *[AIPGME 1996]*
    (a) Isoniazid
    (b) Rifampicin
    (c) Streptomycin
    (d) Ethambutol

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15. Under RNTCP, a patient who was initially sputum smear +ve, who began treatment and who remained or became smear +ve again at 5 months or later during course of treatment is a: *[AIIMS June 98-99]*
(a) New case
(b) Relapse
(c) Failure case
(d) Defaulter

16. A adult male patient presented in the OPD with complaints of cough and fever for 3 months and haemoptysis off and on. His sputum was positive for AFB. On probing it was found that he had already received treatment with RHZE for 3 weeks from a nearby hospital and discontinued. How will you categorize and manage the patient? *[AIIMS May 03]*
(a) Category III, start 2 $(RHZ)_3$
(b) Category II, start 2 $(RHZE)_3$
(c) Category I, start 2 $(RHZE)_3$
(d) Category II, start 2 $(RHZES)_3$

17. 'DOTS' indicates: *[Karnataka 2006]*
(a) Short-term treatment under supervision
(b) Short-term treatment without supervision
(c) Long-term treatment with supervision
(d) Long-term treatment without supervision

18. The sputum examination under DTP is done when the patient present with: *[PGI June 02]*
(a) Cough of 1-2 wks duration
(b) Persistent cough of 1-2 days duration
(c) Hemoptysis
(d) Chest pain
(e) Intermittent fever

19. True about revised National Tuberculosis programme (NTP): *[PGI June 03]*
(a) Active case finding
(b) DOTS applied
(c) Treatment is given only in smear positive cases
(d) General practitioners are restricted to give the treatment
(e) It has replaced NTP

20. Which is not included in RNTCP: *[PGI June 04]*
(a) Active case finding
(b) Directly observed
(c) X-ray is diagnostic
(d) Drugs given daily

21. As per RNTCP Cat-1, should receive:
(a) 4 drugs for 2 months and 2 drugs for 4 months
(b) 3 drugs for two months and 2 drugs for four months
(c) Includes Retreatment cases *[PGI June 04]*
(d) Rx is given daily
(e) Directly observed

22. Features of RNTCP A/E: *[PGI June 04]*
(a) Active case findings
(b) Involvement of NGO
(c) Sputum – 2 times

23. True about DOTS: *[PGI June 2008]*
(a) Drugs are given on supervision
(b) Streptomycin always given in first two months
(c) Intermittent regimen are used
(d) Same regimen is given in all patient
(e) In category – 1. new sputum positive cases sputum examined in 2.5 and 6 months

24. DOTS true about: *[PGI Dec 08]*
(a) Rx under supervision
(b) All given same Rx
(c) Streptomycin given to all
(d) Intermittent regimen
(e) Daily regimen

25. Treatment of choice for sputum positive pulmonary tuberculosis detected in the I trimester of pregnancy is:
(a) Defer treatment till II trimester *[AIIMS May 09]*
(b) Start Category I immediately
(c) Start Category II immediately
(d) Start Category III immediately

26. A pregnant female in first trimester came with sputum positive TB. Treatment of choice: *[AIIMS May 2010]*
(a) Start Cat I treatment immediately
(b) Start Cat II treatment immediately
(c) Start Cat III treatment immediately
(d) Delay treatment till 2nd trimester

27. A person with tuberculosis on domiciliary treatment is expected to do all, *except*:
(a) Dispose sputum safely
(b) Use separate vessels
(c) Collect drugs regularly
(d) Report to PHC if new symptoms arise

28. Dose of Rifampicin in RNTCP is: *[AIIMS November 2013]*
(a) 300 mg *[Recent Question 2013]*
(b) 450 mg
(c) 600 mg
(d) 800 mg

29. Diagnosis of TB according to DOTS (RNTCP) is: *[Recent Question 2013]*
(a) 1 out of 2 samples positive
(b) 2 out of 3 samples positive
(c) 3 out of 3 samples positive
(d) None

30. Drugs are used in AKT-4 kit for TB as: *[Recent Question 2013]*
(a) Decrease in resistance by mutation
(b) Decrease in resistance by conjugation
(c) To cure disease early
(d) None

31. DOTS criteria for TB is positive if:
(a) 1 out of 2 sputum positive *[DNB December 2011]*
(b) 2 out of 3 sputum positive
(c) CxR positive
(d) Mantoux positive

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32. True about Category III RNCTP is/ are: *[PGI November 2012]*
(a) Recently abolished
(b) Meant for MDR-TB treatment
(c) Given for 6 months
(d) Includes defaulters
(e) Based on sputum culture findings

33. Why a TB patient is recommend a regimen of 4 drugs on 1st visit: *[Recent Question 2013]*
(a) To avoid emergence of persistors
(b) To avoid side effects
(c) To cure early
(d) None of the above

34. Category I TB treatment is: *[Recent Question 2013]*
(a) Active
(b) Passive
(c) Both
(d) None

35. RNTCP case finding is: *[Recent Question 2013]*
(a) Active
(b) Passive
(c) Both
(d) None

36. XDR-TB definition include resistance to: *[PGI May 2014] [Recent Question 2014]*
(a) Rifampicin
(b) Any one Fluoroquinolone
(c) INH
(d) Kanamycin
(e) Ethionamide

37. Under RNCTP diagnosis, TB bacilli take up AFB stain faster showing 'Beaded appearance' due to presence of: *[Recent Question 2014]*
(a) Palmitic acid
(b) Wax-D
(c) Cord-factor
(d) Mycolic acid

38. What is New change in Revised National Tuberculosis Control Programme (RNTCP)? *[Recent Question 2014]*
(a) DOTS based therapy
(b) Diagnosis by Sputum smear microscopy
(c) Non-DOTS based therapy
(d) Early diagnosis and treatment

Review Questions

39. Disadvantage of INH prophylaxis are all of the Following *except*: *[Kerala 2001; UP 2004]*
(a) Costly
(b) Not effective
(c) Cannot prevent disease in infected person
(d) Risk of hepatitis

40. If after 2 months of conventional antituberculous therapy, sputum smear examination is positive, it indicates: *[AP 2005]*
(a) Treatment failure
(b) Return after default
(c) Resistant tuberculosis
(d) Category-II failure

41. A patient of tuberculosis was treated 5 years back. Now he represents with symptoms of cough, sputum culture was negative, X-ray changes show opacities, It did not respond to broad spectrum antibiotics. It belongs to which category: *[AP 2006]*
(a) Category I
(b) Category II
(c) Category III
(d) Category IV

42. The drug which is used only in RNTCP CAT II is:
(a) INH *[TN 2005]*
(b) Rifampicin
(c) Streptomycin
(d) Pyrazinamide

43. In revised National tuberculosis control programme main objective is: *[MP 2002]*
(a) To improve patient's compliance
(b) Achievements of high cure rates through DOTS
(c) To decrease development of resistance against Antitubercular drugs
(d) To increase effectiveness

44. Under directly observed treatment of short course chemotherapy, the recommended regimen of category-II treatment is: *[Recent Question 2013, MP 2009]*
(a) 2 $(HRE)_3$.4$(HR)_3$
(b) 2 $(HRZES)_3$. 1$(HRZE)_3$,5$(HRE)_3$
(c) 3 $(HRZES)_3$, 2$(HRZE)_3$'
(d) 2 $(HRZ)_3$. 4 $(HR)_3$

45. In the DOTS strategy under National Tuberculosis Control Programme, the letter 'D' and 'O' stand for which of the following? *[Karnataka 2006; MH 2003]*
(a) Daily observed
(b) Directly observed
(c) Day out
(d) Dually observed

46. Treatment of recently sputum positive case of pulmonary TB is: *[MH 2005]*
(a) RMP + INH + PZM
(b) RMP + INH + PZM + SMC
(c) RMP + INH + PZM + ETM
(d) RMP + INH + ETM

47. The Pillars of Revised National Tuberculosis Control Programme (RNTCP) are all *except*: *[ESIS 2005; MH 2006]*
(a) Achievement of not less than 85% cure rate amongst infectious cases of tuberculosis through short couse chemotherapy involving peripheral health functionary

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(b) Detecting 70% of estimated cases through Quality Sputum Microscopy
(c) Not involving NGO's in RNTCP
(d) Directly observed therapy (short term), is a community based TB treatment and care strategy

48. According to RNTCP, tubercular pericarditis should be treated with which category of anti-tubercular regimen? *[MH 2007]*
(a) Category I
(b) Category III
(c) Category II
(d) Category IV

49. According to RNTCP,the first action to be taken in a person with cough of more than three weeks with one sample of sputum positive? *[MH 2008]*
(a) Star antibiotics for 15 days
(b) Chest X-ray
(c) Sputum sample for AFB
(d) Culture study

NATIONAL POLIO ELIMINATION PROGRAMME

50. Pulse polio immunization is administration of OPV to: *[AIIMS Nov 2007]*
(a) All children between 0—5 years of age on a single day, irrespective of their previous immunization status
(b) Children in the age group of 0—1 year only who have not been immunized earlier
(c) Children in the age group of 12—24 months only, as the booster dose
(d) All children between 0—5 years of age, whenever there is an outbreak of poliomyelitis

51. Under AFP Surveillance, follow-up examination is done after: *[AIPGME 2005]*
(a) 15 days of onset of paralysis
(b) 33 days of onset of paralysis
(c) 60 days of onset of paralysis
(d) 93 days of onset of paralysis

52. All are true regarding AFP Surveillance *except*:
(a) WHO recommends it for age less than 15 yrs
(b) Two stool samples are collected per case
(c) Non-polio AFP rate should be >1 per 100000 among <15 years old *[AIPGME 2004]*
(d) Adequate stool specimens should be taken from 100% AFP

53. Acute flaccid paralysis is reported in a child aged:
(a) 0-3 years *[AIPGME 02]*
(b) 0-5 years
(c) 0-15 years
(d) 0-25 years

54. In Acute Flaccid paralysis, examination for residual paralysis should be done after: *[AIPGME 2010]*
(a) 30 days *[AIIMS May 2012]*
(b) 60 days
(c) 90 days
(d) 120 days

55. Target group for pulse polio immunization is *[Recent Question 2012, MP 2005]*
(a) 0-1 years
(b) 0-3 years
(c) 0-5 years
(d) 0-10 years

56. Line listing of cases of Acute Flaccid Paralysis is done for all of the following reasons *except*: *[NUPGET 2013]*
(a) To check for duplication
(b) To document high risk groups
(c) To confirm year of onset of illnesss
(d) To identify high risk population

57. Under national polio eradication programme, a case of acute flaccid paralysis is confirmed as polio by surveillance after how many days? *[DNB December 2009]*
(a) 15 days (b) 30 days
(c) 60 days (d) 90 days

Review Questions

58. OPV Vaccine type: *[Bihar 2006]*
(a) Killed
(b) Live
(c) Toxoid
(d) None

59. All are true regarding Acute flaccid paralysis in National polio Eradication Programme, *except*: *(UP 2008)*
(a) Acute flaccid paralysis in a child <15 years of age
(b) All cases of AFP should be reported irrespective of diagnosis within 6 months of onset stool
(c) Two specimens collected within 14 days of paralysis onset and at least 24 hours apart
(d) 30 days follow up examination

RCH PROGRAMME

60. Integrated Management of Neonatal and Childhood Illness (IMNCI) includes all *except*: *[AIPGME 09]*
(a) Malaria
(b) Respiratory infections
(c) Diarrhoea
(d) Tuberculosis

61. Essential components of RCH Programme in India include all of the following *except*:
(a) Prevention and management of unwanted pregnancies *[AIPGME 04]*
(b) Maternal care including antenatal, delivery and postnatal services
(c) Reduce the under five mortality to half
(d) Management of reproductive tract infections and sexually transmitted infections

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62. 'Seven Cleans' of safe and hygienic birth practices include: *[AIIMS May 2007]*
(a) Clean walls and Clean floor
(b) Clean towel and Clean water for hand washing
(c) Clean birth canal and Clean cord surface
(d) Clean mind and Clean environment

63. RCH-II (2004-09) has set the goal of achieving a Couple Protection Rate of: *[AIIMS May 2005]*
(a) 48%
(b) 60%
(c) 65%
(d) 100%

64. Elemental iron and folic acid contents of pediatric iron-folic acid tablets supplied under Reproductive and Child Health (RCH) Programme are: *[AIPGME 03]*
(a) 20 mg iron and 100 micrograms folic acid
(b) 40 mg iron and 100 micrograms folic acid
(c) 40 mg iron and 50 micrograms folic acid
(d) 60 mg iron and 100 micrograms folic acid

65. IMNCI differs from IMCI in all *except*:
(a) Malaria and anaemia are included *[AIPGME 2010]*
(b) 0 – 7 days infants are included
(c) Sick neonates are preferred over sick older children
(d) Treatment is aimed at more than one disease (condition) at a time

66. Copper-T with threads is visible in a case of early pregnancy. Treatment of choice is: *[DPG 2011]*
(a) Remove CuT only
(b) Suction evacuation with Copper-T removal
(c) Reassurance and continue pregnancy
(d) Laparotomy

67. According to IMNCI, fast breathing in 5 month child is defined as *[Recent Question 2012]*
(a) >30/min
(b) >40/min
(c) >50/min
(d) >60/min

68. Under RCH programme, intervention done in selected districts *[Recent Question 2013]*
(a) Immunization
(b) Treatment of STD
(c) ORS therapy
(d) Vitamin A supplementation

69. Drug-kit B is given at: *[Recent Question 2012]*
(a) PHC *[Recent Question 2013]*
(b) Subcenter
(c) CHC
(d) FRU level

70. RCH programme includes *[Recent Question 2013]*
(a) CSSM plus school health
(b) CSSM plus family planning
(c) CSSM plus ORS
(d) CSSM plus pneumonia control

71. According to 2006 government of India guidelines for sterilization all are true *except*: *[DNB December 2011]*
(a) Should be married
(b) Female clients should be below the age of 45 years and above the age of 20 years
(c) The couple should have at least on child whose age is above one year unless the sterilization is medically indicated.
(d) Clients or their spouses/partner must not have undergone sterilization in the past

72. Patient treated at home is allotted what color code according to IMNCI color coding *[DNB December 2010]*
(a) Pink
(b) Red
(c) Green
(d) Yellow

73. RCH phase 2 does not include *[Recent Question 2012]*
(a) Immunization of pregnant women
(b) Treatment of STD/RTI
(c) Feed to malnourished children
(d) Early registration of pregnancy upto 12-16 weeks

74. Components of RCH elaborated include
(a) Prevention of STD *[Recent Question 2013]*
(b) Family planning
(c) Child survival
(d) All of the above

75. IMNCI target group is *[Recent Question 2013]*
(a) Upto 5 years
(b) Upto 10 years
(c) Upto 15 years
(d) Upto 20 years

76. Data regarding recent trends of Immunization in Community can be found by *[AIIMS PG May 2015]*
(a) Census data
(b) Rural survey
(c) District level household survey
(d) Sample registration system

77. Screening tests used in Antenatal mothers in RCH-II is *[Recent Question 2015]*
(a) Hemoglobin level
(b) Rh determination
(c) TSH
(d) Urinary deposit analysis for UTI

78. A recently delivered woman with a 15-day old newborn suffering from Cough, sneezing and fever needs help. She has no money for transportation to nearby hospital. Which of the following National Health Programmes can help this woman? *[AIIMS November 2015]*
(a) Facility based IMNCI
(b) Janani Shishu Suraksha Karyakram
(c) Navjat Shishu Suraksha Karyakram
(d) Indira Gandhi Matritava Sahyog Karyakram

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Review Questions

79. RCH II includes: *[Kolkata 2007]*
(a) Low osmolar ors
(b) Adolescent health
(c) Exclusive breast feeding
(d) All

80. In CSSM programme drug of choice for Pneumonia:
(a) Co-trimoxazole *[MP 2000]*
(b) Doxycycline
(c) Erythromycin
(d) Chloramphenicol

81. Recommended dose for treatment of pneumonia of 6 months old child is (1 tablet contains 100 mg of sulphamethozazole and 20 mg of trimethoprim):
(a) ½ tablet twice daily *[MP 2009]*
(b) One tablet twice daily
(c) Two tablets twice daily
(d) Three tablets twice daily

82. According to maternal health programme the daily dose of folic acid for pregnant women should be: *[MH 2005]*
(a) 100 mcg (b) 200 mcg
(c) 300 mcg (d) 400 mcg

NATIONAL BLINDNESS CONTROL PROGRAMME

83. Under the National Programme for Control of Blindness in India, medical colleges are classified as eye care centers of: *[AIIMS Nov 2003]*
(a) Primary level
(b) Secondary level
(c) Tertiary level
(d) Intermediate level

84. A 46 Years old female presented at the eye OPD in a hospital. Her vision in the right eye was 6/60 and in left eye 3/60. Under the National Programme for Control of Blindness, she will be classified as: *[AIIMS May 05]* *[AIIMS Nov 02]*
(a) Socially blind
(b) Low vision
(c) Economically blind
(d) Normal vision

85. According to the World Health Organization, the definition of blindness is: *[TNPG 1994, 2000]* *[AIPGME 06, AIPGME 2000, 01; AIIMS Nov 05]*
(a) Visual acuity < 6/60 in the better eye with available correction
(b) Visual acuity <3/60 in the better eye with available correction
(c) Visual acuity < 6/60 in the better eye with best correction
(d) Visual acuity < 3/60 in the better eye with best correction

86. According to the National Programme for Control of Blindness (NPCB) in India, the definition of blindness is: *[AIPGME 1991]*
(a) Visual acuity < 6/60 in the better eye with available correction
(b) Visual acuity < 3/60 in the better eye with available correction
(c) Visual acuity < 6/60 in the better eye with best correction
(d) Visual acuity < 3/60 in the better eye with best correction

87. The visual acuity used as cut off for differentiating "normal" from "abnormal" children in the School Vision Screening Programme in India is:
(a) 6/6 *[AIIMS Nov 02]*
(b) 6/9
(c) 6/12
(d) 6/60

88. Revised strategies of National Programme for Control of Blindness include all *except*:
(a) To strengthen participation of voluntary organizations *[AIIMS Nov 2006]*
(b) To shift from fixed facility surgical approach to eye camp approach
(c) To enhance coverage of eye care services in tribal and other under-served areas
(d) To strengthen services for transplantation of cornea, treatment of glaucoma

89. Most cost-effective method for cataract surgery in India has been found to be: *[AIPGME 2003]*
(a) Private Hospital
(b) NGO Hospital
(c) Government Camps
(d) NGO organized screening camps followed by surgery at base hospital

90. Match the following NPCB categories of Visual impairment and Blindness: *[AIPGME 1999]*
A < 6/18 to 6/60, I - Economic Blindness
B < 6/60 to 3/60, II - Manifest Blindness
C < 3/60 to 1/60, III - Social Blindness
D < 1/60 to perception of light, IV - Low Vision
(a) A-II, B-IV, C-III, D-I
(b) A-I, B-II, C-IV, D-IV
(c) A-IV, B-I, C-III, D-II
(d) A-IV, B-II, C-III, D-I

91. Prevalence of blindness in India is 1.1 %. This has been calculated using following cut off for blindness:
(a) 3/60 *[AIIMS Feb 1997]*
(b) 6/60
(c) 1/60
(d) 6/18

92. All of the following are given global prominence in the VISION 2020 goals, *except*: *[AIIMS May 07]*
(a) Refractive errors *[AIIMS May 2010]*
(b) Cataract
(c) Trachoma
(d) Glaucoma

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93. Target diseases for VISION 2020 in India does not include: *[AIPGME 2012, AIIMS May 2007-2008]*
(a) Refractive errors and Low vision
(b) Diabetic retinopathy
(c) Trachoma
(d) Xerophthalmia

94. The eye condition for which the World Bank assistance was provided to the National Programme for Control of Blindness (1994-2001) is: *[AIIMS May 07]*
(a) Cataract
(b) Refractive errors
(c) Trachoma
(d) Vitamin A deficiency

95. Under the school eye-screening programme in India, the initial vision screening of school children is done by: *[AIPGME 2006]*
(a) School teachers
(b) Primary level health workers
(c) Eye specialists
(d) Medical officers

96. Under national blindness control programme social blindness is vision between: *[AIPGME 2004]*
(a) 3/60 and 1/60
(b) PL – ve
(c) 6/60 and 3/60
(d) below 1/60 but PL + ve

97. False about School Vision Screening Programme is:
(a) Age group screened is 5-10 years *[AIIMS Nov 2007]*
(b) Screening is done by Teacher
(c) One teacher is for 150 students
(d) Cut off for referral of a child is vision < 6/9

98. SAFE strategy has been developed for the control of:
(a) Onchocerciasis *[AIPGME 07]*
(b) Trachoma
(c) Refractive error
(d) Ocular trauma

99. About National Programme for Control of Blindness (NPCB), all are true *except*: *[AIIMS May 09]*
(a) Increase cataract surgery rate to 450 operations per one lac population
(b) Intra-ocular lens implanation in more than 80% of cataract surgery cases
(c) 100% coverage of vitamin A prophylaxia doses from 9 months to 3 years age
(d) Development of 50 paediatric ophthalmology units

100. Which of the following Health organisation is not a part of Vision 2020? *[AIIMS November 2011]*
(a) UNICEF
(b) WHO
(c) Orbis
(d) International Agency for Prevention of Blindness

101. Number of Vision centers under Vision 2020, National Programme for Control of Blindness are *[AIIMS May 2013]*
(a) 20
(b) 200
(c) 2000
(d) 20000

102. In SAFE strategy, S stands for *[DNB December 2011]*
(a) Surgery
(b) Syringing
(c) Streptomycin
(d) All of the above

103. Follow-up of Cataract operations in National Blindness Control Programme is done by *[AIIMS November 2013]*
(a) Active surveillance
(b) Passive surveillance
(c) Sentinel surveillance
(d) Routine check-up

104. In Vision 2020, the target for secondary service centre is for how much population *[AIIMS May 2012]*
(a) 10000
(b) 50000
(c) 100,000
(d) 500,000

105. In vision 2020, recommended ophthalmic personnel per population ratio is *[AIIMS May 2012]*
(a) 5000
(b) 10000
(c) 50000
(d) 100,000

106. Under National Programme for Control of Blindness, District blindness control society is headed by: *[AIIMS November 2014]*
(a) District programme manager *[Recent Question 2014]*
(b) District eye surgeon
(c) District collector
(d) District health officer

107. False regarding provisions under National Programme for Control of Blindness *[Recent Question 2015]*
(a) Telemedicine ophthalmology
(b) Hire counsellor for Eye donation bank
(c) Ophthalmic assistant for PHC
(d) Giving 1000 Rupees per Cataract surgery to NGO

Review Question

108. Mobile eye care services are not done at which level:
(a) Primary care level *[RJ 2007]*
(b) Secondary care
(c) Tertiary care
(d) District hospitals

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NATIONAL HIV/AIDS CONTROL PROGRAMME

109. "3 BY 5 target" approach refers to: *[AIIMS Nov 04]*
(a) Providing 3 ART drugs to all patients by 2005
(b) Providing ART to 3 million people by 2005
(c) Providing 3 antiretroviral drugs to all patients
(d) All of above

110. For diagnosis of HIV infection in asymptomatic, minimum number of tests required is/are:
(a) 1 *[AIIMS Nov 2003]*
(b) 2
(c) 3
(d) 4

111. Route for HIV transmission with maximum efficiency is: *[AIIMS Nov 1999]*
(a) Sexual
(b) Transfusion of blood/blood products
(c) Sharing needles/syringes
(d) Mother to child transmission

112. CTL inducing vaccines, Recombinant Adeno-associated Virus Vaccine (rAAV) and Modified Vaccinia Ankara (MVA) are being developed for: *[AIPGME 2002]*
(a) Tuberculosis
(b) Leprosy
(c) Malaria
(d) HIV/AIDS

113. Targeted Interventions for HIV is done for all *except*:
(a) Commercial sex workers *[AIIMS May 2009]*
(b) Migrant labourers
(c) Street children
(d) Industrial workers

114. According to CDC recommendations, HIV screening of pregnant women is: *[AIIMS May 09]*
(a) Opt-in testing
(b) Opt – out testing
(c) Compulsory
(d) Symptomatic

115. Drugs used to prevent Mother-to-child transmission of HIV in India is are *[PGI November 2012]*
(a) Lamivudine
(b) Zidovudine
(c) Nevirapine
(d) Ribavirin
(e) Stavudine

116. Sentinel surveillance for HIV under National AIDS Control programme is used for all *except*: *[AIIMS May 2014]*
(a) Estimation of total infection in community
(b) Estimation of total cases in hospitals
(c) Estimation of trend of the disease
(d) Classification of districts

117. Anti-retroviral therapy is started when CD4 count is less than *[Recent Question 2014]*
(a) 100
(b) 200
(c) 350
(d) 400

118. Which of the following RTI/ STI colour coded kits wrongly matched? *[Recent Question 2014]*
(a) Kit 1 – Grey
(b) Kit 2 – Green
(c) Kit 3 – White
(d) Kit 4 – Red

119. According to Suraksha Clinic in National AIDS Control Programme, infant coming with lower abdominal pain, the color code of kit in treatment is *[Recent Question 2014]*
(a) White (b) Yellow
(c) Green (d) Grey

120. Current WHO recommendations for initiating Anti-Retroviral treatment (ART) in HIV+ve individuals is *[UPSC CMS 2015]*
(a) CD_4 cells less than 200 cells/mm^3
(b) CD_4 cells less than 250 cells/mm^3
(c) CD_4 cells less than 300 cells/mm^3
(d) CD_4 cells less than or equal to 350 cells/mm^3

121. NACO launched National Pediatrics AIDS Initiative on *[Recent Question 2015]*
(a) 02 October 2005
(b) 30 November 2006
(c) 30 October 2008
(d) 02 November 2010

Review Questions

122. To prevent vertical transmission of HIV in a child of pregnant mother, used is: *[DNB 2002]*
(a) Single dose of Nevirapine mother and child
(b) Zidovudine for 3 months
(c) Observation
(d) Zidovudine for 6 months

123. Helpline for AIDS can be reached by dialling:
(a) 1079 *[TN 2005]*
(b) 1091
(c) 1098
(d) 1097

124. Drug of choice for chemoprophylaxis of plague is:
(a) Streptomycin *[MP 2005]*
(b) Tetracycline
(c) Penicillin
(d) Erythromycin

125. For prevention of mother to child transmission of HIV infection the dose of nevirapine to be given to the mother at the onset of labour is: *[MP 2006]*
(a) 200 mg
(b) 300 mg
(c) 500 mg
(d) 750 mg

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126. HIV sentinel surveillance was started in 1994 with how many sentinel sites: *[MP 2009]*
(a) 55
(b) 155
(c) 255
(d) 355

NATIONAL VECTOR BORNE DISEASES CONTROL PROGRAMME

127. All of the following are activities in Modified Plan of Operation in areas where API is less than 2, *except*:
(a) Active and passive surveillance every fortnight
(b) Insecticidal spray with rounds of HCH every 6 weeks *[AIPGME 1995]*
(c) Radical treatment of all cases detected
(d) Mass surveys

128. Which of the following is not reported in India?
(a) Plasmodium vivax *[AIIMS Dec 1991]*
(b) Plasmodium falciparum
(c) Plasmodium ovale
(d) Plasmodium malariae

129. 'Dipstick Test' for rapid diagnosis of Plasmodium falciparum is based on: *[AIIMS Nov 2004]*
(a) Arginine-rich protein
(b) Histidine-rich protein
(c) Tyrosine-rich protein
(d) Serine-rich protein

130. PHCs selected under Enhanced Malaria Control Project were having: *[AIIMS May 2004]*
(a) API < 2 in last 3 years
(b) Pf cases less than 5% of all malaria cases
(c) 100% population is tribal
(d) Area has been reporting malaria deaths

131. Insecticide treated Bed nets (ITBN) are treated with:
(a) Deltamethrin and Cyfluthrin *[AIIMS May 2003]*
(b) Diethyltoulamide
(c) Pyrethrum
(d) Malathion

132. Insecticide of choice for Phlebotamus argentipes is:
(a) DDT *[AIIMS Nov 2003]*
(b) BHC
(c) Malathion
(d) Pyrethrum

133. According to modified plan of operation, endemic areas were classified based on: *[DPG 2004]*
(a) ABER
(b) API
(c) Slide positivity rate
(d) Slide falciparum rate

134. Measurement of operational efficiency of National Anti Malaria Programme (NAMP) is done by: *[DPG 2006]*
(a) Annual parasite incidence (API)
(b) Annual Blood Examination Rate (ABER)
(c) Infant parasite rate
(d) Slide positivity rate

135. An index of operational efficiency of the malaria control programme is: *[Karnataka 2005]*
(a) Annual parasite incidence
(b) Annual blood examination rate
(c) Slide positivity rate
(d) Human blood index

136. Patient was given chloroquine and doxycycline for 7 days. Patients fever decreases in 4 days, but, peripheral smear showed occasional gametocytes of Plasmodium falciparum. This type of drug resistance:
(a) R1 type
(b) R2 type
(c) R3 type
(d) R4 type

137. In a town with population of 100,000 the number of slides examined is 5000. Out of these, 100 slides were positive for malaria. The API is: *[DNB December 2010]*
(a) 2 (b) 5
(c) 1 (d) 0.5

138. In Roll Back Malaria programme, which of the following is not a component? *[AIIMS November 2013]*
(a) Training for health care worker
(b) Using Insecticide-treated bednets
(c) Developing newer insecticides
(d) Strengthening health system

139. NVBDCP does not include *[Recent Question 2013]*
(a) Malaria
(b) Filariasis
(c) Kala azar
(d) Chikungunya fever

140. Urban malaria scheme is based on:
(a) API levels *[Recent Question 2012]*
(b) Anti-adult measures
(c) Anti-larval measures
(d) Drug based treatment

141. Burden of malaria is best estimated by:
(a) Mosquito rate *[Recent Question 2012]*
(b) API
(c) Parasite rate
(d) SPR

142. Dose of Chloroquine when used for Chemoprohylaxis of Malaria is: *[Recent Question 2014]*
(a) 300 mg twice/week
(b) 600 mg once/week
(c) 600 mg/week
(d) 300 mg Once/week

143. Most efficient anti-larval measure to prevent urban malaria is: *[AIIMS November 2014]*
(a) Clean drainage and sewerage systems
(b) Cover overhead tanks properly
(c) Filling cesspools and ditches
(d) Cover pits

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144. Treatment of Severe Falciparum malaria is: *[AIIMS November 2014]*
(a) Chloroquine
(b) Mefloquine
(c) Quinine
(d) Primaquine

145. Malaria Eradication Programme India based on use of Insecticides aims to reduce Lifespan of mosquito to less than *[Recent Question 2015]*
(a) 1 day
(b) 3 days
(c) 6 days
(d) 10 days

146. A pregnant woman in third trimester having fever was diagnosed as a case of Falciparum malaria. Under the National Health Programme, which drug is recommended? *[UPSC CMS 2015]*
(a) ACT only
(b) ACT accompanied by single dose of Primaquine on day 2
(c) Only Quinine
(d) Chloroquine

147. The causes for Resurgent malaria include following *except*: *[ESI IMO 2014]*
(a) Inadequate vector control
(b) Mosquito mutations
(c) Improper use of drug treatment
(d) Increase in the number Plasmodium species

148. According to Revise Malaria Drug Policy 2013, all are true *except*: *[AIIMS November 2015]*
(a) Presumptive treatment with Chloroquine is given
(b) ACT is not given in Falciparum
(c) Primaquine is not given in Falciparum malaria
(d) Primaquine contraindicated in infants and pregnant women

Review Questions

149. Plasmodium vivax malaria in pregnancy should be treated in pregnancy by: *[Kolkata 2004]*
(a) Chloroquine
(b) Quinine
(c) Pyrimethamine
(d) Mefloquine

150. According to NMEP, malaria surveillance should be done every: *[MH 2002]*
(a) Fortnightly (b) Yearly
(c) Monthly (d) Weekly

151. In malaria control programme the endemic areas are reclassified according to modified operation plan of malaria (MOP) depending on: *[MH 2005]*
(a) Infant parasite rate
(b) ABER
(c) Splenic rate
(d) Annual parasite index

152. According Malaria Control Programme, single dose Chloroquine _____ mg is given after taking blood smear (presumptive treatment): *[MH 2005]*
(a) 300
(b) 400
(c) 600
(d) 800

NRHM

153. About ASHA (Accredited Social Health Activist) true is all *except*: *[AIIMS Nov 06, AIIMS May 07]*
(a) They are preferably females
(b) There is one ASHA worker per 1000 population
(c) ASHA is skilled birth attendant
(d) Provides primary medical care for minor ailments

154. Under National Rural Health Mission, ASHA stands for: *[AIIMS May 2007]*
(a) A Social Health Agent
(b) A Specific Health Agent
(c) Accredited Social Health Activist
(d) Advanced Scientific Health Activist

155. Under National Rural Health Mission, lowest level at which Health Action Plan is prepared is:
(a) State level *[AIIMS Nov 2007]*
(b) District Level
(c) Subcentre Level
(d) Village Level

156. Which of the following is the 'Impact indicator' for evaluation of ASHA's performance?
(a) Number of meetings attended
(b) Number of institutional deliveries
(c) Reduction in infant mortality
(d) Hours of training *[AIIMS November 09]*

157. All are included in National Rural Health Mission (NRHM) *except*: *[AIIMS Nov 09]*
(a) Strengthening of JSY (Janani Suraksha Yojana
(b) Formation of family health and social welfare societies
(c) State and district health mission
(d) Recruitment and training of ASHA

158. Which of the following is the ego-expansion of JSY?
(a) Janani Surakshan Yojana *[AIPGME 2010]*
(b) Janani Samridhi Yojana
(c) Janani Swarojgar Yojana
(d) Janani Sampoorna Yojana

159. Resource persons for training of ASHA:
(a) Medical officer and ANM *[AIPGME 2012]*
(b) Medical officer and Anganwadi worker
(c) ANM and Anganwadi worker
(d) Medical officer

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160. ASHA is recruited under? *[Recent Question 2013]*
(a) NRHM
(b) National urban health mission
(c) ICDS
(d) Village health system

161. Janani Suraksha Yojana includes? *[DNB December 2011]*
(a) Tetanus immunization
(b) Institutional deliveries
(c) Iron supplementation
(d) Abortions

162. ASHA full form is: *[Recent Question 2013] [DNB December 2011]*
(a) Accredited Social Health Activist
(b) A Social Health Agent
(c) A Specific Health Agent
(d) Advanced Scientific Health Activist

163. NRHM was started in: *[Recent Question 2013] [Recent Question 2014]*
(a) 2005
(b) 2006
(c) 2007
(d) 2009

164. ASHA gets remuneration on all *except*:
(a) Institutional delivery *[AIIMS May 2013]*
(b) Zero dose of OPV and BCG *[AIIMS May 2014]*
(c) Recording birth weight
(d) Birth registration

165. All are true about Janani Shishu Suraksha Karyakram (JSSK), *except*: *[AIIMS May 2014]*
(a) Free diet to mother during hospital stay
(b) Free delivery *[Recent Question 2014]*
(c) Free transport from home to hospital and back
(d) Free treatment of sick infants up to 1 year

166. Asha worker works for ..... population:
(a) 3000 *[Recent Question 2014]*
(b) 1000
(c) 5000
(d) 400

167. ASHA is located at: *[Recent Question 2014]*
(a) Subcentre
(b) PHC
(c) CHC
(d) Village

168. Features of Janani Suraksha Yojana are the following *except*: *[UPSC CMS 2015]*
(a) 100% Centrally sponsored scheme
(b) ASHA is a link between Woman and Government
(c) Cash assistance is given to mothers for high and low performing states
(d) It promotes institutional deliveries

Review Questions

169. Under National Rural Health mission who will be the link person between community and health care services? *[MP 2006]*
(a) Anganwadi worker
(b) TBA
(c) ASHA
(d) ANM

170. All are correct statement about ASHA *except*:
(a) Female trained village guide *[RJ 2009]*
(b) One per village
(c) One per 1000 population
(d) Female untrained guide

NATIONAL LEPROSY ELIMINATION PROGRAMME

171. A leprosy case with a single anesthetic patch is treated with: *[AIIMS June 2000]*
(a) Rifampicin + dapsone
(b) Rifampicin + of loxacin + minocycline
(c) Rifampicin + dapsone + clofazimine
(d) Rifampicin + clofazimine

172. Multi drug therapy (MDT) is treatment for:
(a) TB *[AIIMS Nov 2000]*
(b) Leprosy
(c) HIV
(d) All of the above

173. A 27- year-old patient was diagnosed to have borderline leprosy and started on multibacillary multi-drug therapy. Six weeks later, he developed pain in the nerves and redness and swelling of the skin lesions. The management of his illness should include all of the following, *except*: *[AIPGME 1992 and 2004]*
(a) Stop anti-leprosy drugs
(b) Systemic corticosteroids
(c) Rest to the limbs affected
(d) Analgesics

174. Survey Education and Treatment Center (SET Centers) cover a population of: *[AIIMS Nov 2000]*
(a) 20-25000
(b) 50000
(c) 1 lakh
(d) 4.5 lakh

175. 'Accompanied MDT' in NLEP implies:
(a) A patient will be given MDT only in the presence of a MDT provider *[AIPGME 2006]*
(b) MDT should be accompanied with Steroids/Clofazimine to help fight Reversal reactions
(c) Any responsible person from family or village can collect MDT, if patient is unable to come
(d) MDT prescription should be accompanied by all the precautions to be observed by the patient

176. Treatment duration for multibacillary leprosy is:
(a) 12 months *[PGI 2002]*
(b) 18 months
(c) 24 months
(d) 5 years

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177. **Multibacillary leprosy follow-up duration:** *[DNB 2008]*
(a) 12-18 months *[Recent Question 2012]*
(b) 2 years
(c) 5 years
(d) 10 years

178. **For treatment of paucibacillary leprosy drugs used are:**
(a) Dapsone *[Recent Question 2012]*
(b) Dapsone, Rifampicin *[UP 2007]*
(c) Rifampicin, Clofazimine
(d) Dapsone, Rifampicin, Clofazimine

179. **National Leprosy Eradication Programme started in:**
(a) 1949 *[Recent Question 2012]*
(b) 1955
(c) 1973
(d) 1983

180. **Two years duration in terms of leprosy is with regard to:** *[Recent Question 2012]*
(a) Treatment of paucibacillary leprosy
(b) Treatment of multibacillary leprosy
(c) Post-treatment surveillance of paucibacillary leprosy
(d) Post-treatment surveillance of multibacillary leprosy

181. **Which of the following Anti-leprotic drugs is not given in blister packs of NLEP?** *[Recent Question 2014]*
(a) Dapsone
(b) Rifampicin
(c) Clofazimine
(d) Minocycline

182. **In a case of Paucibacillary leprosy, treatment is considered adequate if the patient has received the six monthly doses of combined therapy within** *[UPSC CMS 2015]*
(a) 6 months
(b) 9 months
(c) 12 months
(d) 15 months

OTHER PROGRAMMES

183. **The Long term objective of National Programme for Prevention and Control of Deafness is:**
(a) To reduce disease burden by 25% by end of XI Five Year Plan *[AIIMS May 2007]*
(b) To reduce disease burden by 50% by end of XI Five Year Plan
(c) To reduce disease burden by 75% by end of XI Five Year Plan
(d) To reduce disease burden by 100% by end of XI Five Year Plan

184. **The best indicator for monitoring the impact of Iodine Deficiency Disorders control programme is:** *[DNB 2007, AIPGME 05, AIIMS Nov 2006, AIPGME 07]*
(a) Prevalence of goiter among school children
(b) Urinary iodine levels among pregnant women
(c) Neonatal Hypothyroidism
(d) Iodine level in soil

185. **Under National programme for prevention of nutritional blindness, a child in the age group of 6-11 months is given a mega dose of vitamin A equal to:**
(a) 50,000 IU *[AIIMS Nov 05]*
(b) 1 lakh IU
(c) 1.5 lakh IU
(d) 2 lakh IU

186. **The premium of the "Community based Universal Health Insurance Scheme" launched during 2003-04 ranges from:** *[AIPGME 06]*
(a) ₹ 1 per day poor and individual to ₹ 2 per day for a family of seven
(b) ₹ 1 per day poor and individual to ₹ 3 per day for a family of seven
(c) ₹ 2 per day poor and individual to ₹ 2 per day for a family of seven
(d) ₹ 1 per day poor and individual to ₹ 7 per day a family of seven

187. **Elemental iron and folic acid content of iron and folic acid adult tablets supplied under the National Programme for Anaemia Prophylaxis are:**
(a) 60 mg of elemental iron and 250 micrograms of folic acid *[AIIMS May 1997]*
(b) 100 mg of elemental iron and 500 micrograms of folic acid
(c) 120 mg of elemental iron and 750 micrograms of folic acid
(d) 200 mg of elemental iron and 1000 micrograms of folic acid

188. **The Vitamin A supplement administered in "Prevention of nutritional blindness in children programme" contains:** *[AIPGME 2003]*
(a) 25,000 IU/ml
(b) 1 lakh IU/ml
(c) 3 lakh IU/ml
(d) 5 lakh IU/ml

189. **Blood smear must be made at night for which of the following conditions?** *[DPG 2004]*
(a) Malaria
(b) Filaria
(c) Leprosy
(d) Onchocerciasis

190. **Minimum level of iodine in iodized salt reaching the consumer level according to Iodine programme should be:** *[Recent Question 2013] [DPG 2006]*
(a) 15 ppm (b) 30 ppm
(c) 5 ppm (d) 20 ppm

191. **Effective Leprosy Control Programmes may be indicated by all *except*:** *[AIIMS Nov 09]*
(a) High new case detection rate
(b) Increasing no. of children affected
(c) Decreased type II disability
(d) Proportion of multi-bacillary cases on treatment

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192. STEPS done for: *[Recent Question 2013] [AIIMS May 2010]*
(a) Surveillance of risk factors of non-communicable disease
(b) Surveillance of incidence of non-communicable disease
(c) Surveillance of evaluation of treatment of non-communicable disease
(d) Surveillance of mortality from non-communicable disease

193. Rashtriya Swasthya Bima Yojana, all are true *except*: *[AIIMS November 2013]*
(a) Applicable for BPL only
(b) Entitled for 30000 rupees
(c) Pay and reimbursement follows
(d) Is a type of employment scheme

194. Rashtriya Swasthya Bima Yojana is: *[AIIMS May 2012]*
(a) Government run insurance scheme for its employees
(b) Government run insurance scheme for all citizens
(c) Government run insurance scheme for poor
(d) Private insurance company run scheme for all poor

195. True about Rashtriya Swasthya Bima Yojana is: *[AIIMS November 2012]*
(a) Applies to BPL families only
(b) Annual cover is Rupees 30000/- per family member
(c) 75% premium is borne by family
(d) Implemented all over India

196. Mental health programme was started in:
(a) 1982 *[Recent Question 2013]*
(b) 1987
(c) 1990
(d) 1995

197. Which of the following diseases is not under surveillance in Integrated Disease Surveillance Project (P-FORM)?
(a) Snake bite *[AIIMS May 2013]*
(b) Acute Respiratory Tract Infections
(c) Tuberculosis
(d) Leptospirosis

198. Disease NOT covered under Integrated Disease Surveillance Project (IDSP) is *[AIIMS November 2013]*
(a) Meningococcal disease
(b) Tuberculosis
(c) Herpes zoster
(d) Cholera

199. National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke (NPCDCS), true is *[AIIMS May 2013]*
(a) Separate centre for stroke, DM, cancer
(b) Implementation in some 5 states over 10 districts
(c) District hospital has specialised facilities
(d) Subcentre has facility for diagnosis and treatment

200. True about National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke is *[AIIMS November 2012]*
(a) Home based care is not given
(b) Implementation in some 5 states over 10 districts
(c) Separate centre for stroke, DM,
(d) CHC has facilities for diagnosis and treatment of CVD, Diabetes

201. Type of surveillance included in integrated disease control programme for non-communicable disease is:
(a) Sentinel surveillance *[DNB December 2010]*
(b) Regular surveillance
(c) Periodic regular survey
(d) Additional state priority

202. Most sensitive indicator of Hypothyroidism in a community is *[AIIMS May 2014]*
(a) T4
(b) Neonatal hypothyroidism
(c) TSH
(d) Median urinary iodine excretion

203. What is the new change in National Programme on Prevention and Control of Diabetes, Cardiovascular diseases and Stroke? *[Recent Question 2014]*
(a) Opportunistic screening
(b) Awareness of lifestyle and behavior related diseases
(c) Specialized units at Medical colleges
(d) Integration with National Cancer Control Programme

204. In Integrated Disease Surveillance Project in India, which of the following type of diagnosis is done by PHC Medical Officer? *[PGMCET 2015] [Recent Question 2015]*
(a) Syndromic
(b) Presumptive
(c) Confirmed
(d) Laboratory

205. Laboratory report of diseases sent as 'L-form' in IDSP is *[Recent Question 2015]*
(a) Syndromic diagnosis
(b) Presumptive diagnosis
(c) Confirmed diagnosis
(d) Active surveillance

206. Not included in National Mental Health Programme 1982 *[AIIMS November 2014]*
(a) Minimum mental health care for all
(b) Application of mental health knowledge in general health care
(c) Human rights of mentally ill
(d) Community participation in mental health service development

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207. All are true about Swajaldhara programme *except*: *[Recent Question 2015]*
(a) Community led, participatory program
(b) Provide drinking water in Rural areas
(c) State Government maintain and manage all water supply
(d) Encourage water harvesting practices

208. Which National Programme came into existence during 11th Five Year Plan? *[UPSC CMS 2015]*
(a) National Cancer control programme
(b) National Cardiovascular diseases & Stroke control programme
(c) National Diabetes and Cancer control programme
(d) National Programme for prevention and control of Cancer, Diabetes, Cardiovascular diseases and Stroke

Review Questions

209. True about Mid-day meal given in school is:

	Calories	Proteins	*[DNB 2005]*
(a)	1/3	1/2	
(b)	1/3	1/3	
(c)	1/2	1/2	
(d)	1/2	1/3	

210. According to WHO, treatment of paucibacilary leprosy is: *[UP 2002]*
(a) 6 month
(b) 1 year
(c) 2 year
(d) 4 years

211. The goal of National Leprosy Eradication Programme is to bring the prevalence of leprosy to less than one per: *[MH 2005]*
(a) 100
(b) 1000
(c) 10,000
(d) 1,00,000

212. Treatment of lepromatous leprosy is: *[MHPCMCET 2003; MH 2005]*
(a) Rifampicin + Dapsone
(b) Rifampicin + Clofazamine
(c) Rifampicin + Dapsone + Clofazamine
(d) Rifampicin + Ofloxacin + Minocycline

213. In leprosy mass survey is done if prevalence is (per 1000 person): *[RJ 2003]*
(a) 1 (b) 5
(c) 7 (d) 10

214. The multidrug regimen under the National Leprosy Eradication programme for the treatment of all multi-bacillary leprosy would include: *[RJ 2007]*
(a) Clofazimine, thiacetazone and dapsone
(b) Clofazimine, Rifampicin and dapsone
(c) Ethionamide, Rifampicin and dapsone
(d) Propionamide, Rifampicin and dapsone

215. All are true of Midday School Meal Programme except: *[AP 2004]*
(a) Should supply ½ daily protein and ⅓ rd or daily calories
(b) Is a substitute for regular food
(c) Locally available foods are used
(d) Cheap and easy to prepare

216. As per national iodine deficiency disorder prevention and control programme, how much iodine should be there in the salt at the point of consumption? *[MP 2006]*
(a) 7 ppm
(b) 10 ppm
(c) 15 ppm
(d) 30 ppm

217. Single massive dose of vitamin A for preventing the deficiency in preschool children between the age of 1-6 years for every 6 months is: *[MH 2007]*
(a) 2,000 IU
(b) 20,000 IU
(c) 2,00,000 IU
(d) 20,00,000 IU

MISCELLANEOUS (H. PROGRAMMES)

218. A young boy had a flea bite while working in a wheat grain godown. After 5 days he developed fever and had axillary lymphadenopathy. A smear was sent to the laboratory to perform a specific staining. Which one of the following staining methods would help in the identification of the suspected pathogen? *[AIPGME 2006]*
(a) Albert staining
(b) Zeihl-Neelson staining
(c) McFadyean's staining
(d) Wayson's staining

219. Simplified Information System plays an important role as part of MIS in: *[AIIMS Nov 2005]*
(a) RNTCP
(b) National Leprosy Eradication Programme
(c) National Vector Borne Disease Control Programme
(d) National AIDS Control Programme

220. Which of the following drugs is not given as supervised regimen in National Health programmes of India: *[AIIMS Nov 09]*
(a) Clofazimine
(b) Dapsone
(c) Rifampicin
(d) Pyrazinamide

221. Which of the following programmes were started before 1960? *[PGI November 2011]*
(a) Malaria
(b) Filaria
(c) Leprosy
(d) TB
(e) Blindness

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222. KISHORI SHAKTI YOJANA has been designed to improve nutritional status of *[NUPGET 2013]*
(a) Adult men
(b) Adolescent girls
(c) Under five children
(d) Senior citizens

223. WHO funds which of the following programmes in India? *[Recent Question 2013]*
(a) RNTCP
(b) National Leprosy Eradication Programme
(c) Janani Suraksha Yojnna
(d) National old age pension plan

224. Disease not under integrated disease surveillance project is *[Recent Question 2013] [DNB December 2011]*
(a) TB
(b) Meningoencephalitis
(c) Cholera
(d) Herpes zoster

225. Integrated Child Protection Scheme is under which ministry? *[Recent Question 2012]*
(a) Health & Family Welfare
(b) Women & Child Development
(c) Home Affairs
(d) Labour

226. ICDS was launched in *[Recent Question 2012]*
(a) 1955 (b) 1968
(c) 1975 (d) 2005

227. Direct cash transfer scheme to adolescent girls is covered under *[Recent Question 2012]*
(a) Indira Gandhi scheme
(b) Rajiv Gandhi scheme (SABLA)
(c) CSSM
(d) RCH

228. 'NIKSHAY' is newly launched Central Government software. It is used for tracking *[AIIMS PG May 2015]*
(a) High risk newborns
(b) Malaria
(c) Tuberculosis
(d) High risk pregnancies

229. Link worker scheme are in which National health programme? *[Recent Question 2015]*
(a) RNTCP
(b) NACP
(c) NLEP
(d) ICDS

Review Questions

230. Ultimate aim in health programme is: *[UP 2001]*
(a) To attain the goal of health
(b) Supply the safe drinking water and sanitation
(c) Provision of legislative support to health protection
(d) Research into alternative methods of health care delivery

231. Directly observed treatment (DOTs) agents is under: *[MP 2005]*
(a) Revised National Tuberculosis Control Programme
(b) Reproductive and Child Health (RCH) Programme
(c) National AIDs Control Programme
(d) National Leprosy Eradication Programme

RASHTRIYA SWASTHYA BIMA YOJANA

232. True regarding Rashtriya Swasthya Bima Yojana is *[AIIMS November 2015]*
(a) Treatment provided only in Government hospitals
(b) Valid for 4-member family only—Head, Spouse, 2 Children
(c) Can avail facility in any hospital using his Smart card and Fingerprint
(d) Cashless benefit in hospitals

NATIONAL HEALTH POLICY

233. India aims to eliminate _____by 2015:
(a) Malaria *[MH 2008, AIPGME 2010]*
(b) TB
(c) Filariasis
(d) HIV

234. Maternal mortality must be reduced to less than:
(a) 100 *[Recent Question 2013]*
(b) 200
(c) 300
(d) 400

Review Question

235. National health policy is based on: *[RJ 2003]*
(a) Primary health care
(b) Tertiary care
(c) Child care
(d) Mother Care

NATIONAL POPULATION POLICY

236. 'Preferable' age for marriage for girls under National Population Policy 2000 is: *[AIIMS Nov 2002]*
(a) 18 years
(b) 19 years
(c) 20 years
(d) 21 years

237. National Population Policy 2000 has set a goal (by 2010) for 100 % Registration of all the following *except*:
(a) Births and Deaths *[AIIMS May 2003]*
(b) Marriages
(c) Divorces
(d) Pregnancies

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238. **The National Population Policy 2000 aims to achieve Total Fertility Rate of 2.1 by the year:** *[AIPGME 2004]*
(a) 2005 (b) 2010
(c) 2015 (d) 2050

239. **National Population Policy 2000 aims to achieve all *except*:** *[Karnataka 2007]*
(a) Targets to be achieved by the year 2010
(b) Reduction of IMR to less than 30 live births/1000 live births
(c) Reduction of MMR to less than 100 /1000 live births
(d) Achieve 100% registration of births, deaths, marriage and pregnancy

240. **Goals of national population policy are all *except*?** *[AIIMS May 2011]*
(a) Decrease IMR to below 30/1000 live births
(b) Reduce MMR to below 100/100000 live births
(c) Achieve 100% registration of births, deaths, marriage and pregnancy
(d) Bring down TFR to replacement levels by 2015

Review Question

241. **National Population Policy was started from which of the following year?** *[MH 2003]*
(a) 1976
(b) 1980
(c) 1986
(d) 1988

NATIONAL MENTAL HEALTH POLICY

242. **National Mental Health Policy of India was launched in** *[Recent Question 2015]*
(a) 1982
(b) 1987
(c) 1994
(d) 2014

IT ACT

243. **The information technology has revolutionized the world of medical sciences. In which of the following year the Information Technology Act was passed by the Government of India?** *[AIPGME 2005]*
(a) 1998
(b) 2000
(c) 2001
(d) 2003

OT ACT

244. **Transplantation of Human Organs Act was passed by Government of India in:** *[AIPGME 05, 06]*
(a) 1996
(b) 1993
(c) 1998
(d) 1994

245. **According to Organ Transplantation Act 1994, what is the punishment for doctor if found guilty?** *[AIIMS November 2011]*
(a) 1 year
(b) 2 years
(c) 2-5 years
(d) More than 5 years

CBD REGISTRATION ACT

246. **According to Registration of Births and Deaths Act 1969, the birth and death are to be registered, respectively in:** *[AIPGME 1999]*
(a) 14 days and 7 days
(b) 7 days and 14 days
(c) 14 days and 21 days
(d) 21 days and 21 days

247. **Birth and Death registration Act came into force on 1st April,** *[Recent Question 2015]*
(a) 1968
(b) 1969
(c) 1970
(d) 1971

OTHER LEGISLATIONS

248. **National Rural Employment Guarantee Act (NREGA) was passed in:** *[AIIMS May 2007]*
(a) 1947
(b) 1991
(c) 2005
(d) 2008

249. **'Professional Misconduct' specified under MCI Act include all *except*:** *[AIPGME 1998]*
(a) Alcoholism
(b) Smoking
(c) Adultery
(d) Human Rights Violation

250. **Census 2001 Population Count was as on:**
(a) 00.00 hrs 01 March *[AIIMS May 2003]*
(b) 06.00 hrs 01 March
(c) 00.00 hrs 31 March
(d) 00.00 hrs 01 April

251. **Which act was passed before independence?**
(a) MTP *[DPG 2008]*
(b) Indian factories act
(c) Workman's compensation act
(d) ESI

252. **MTP Act of 1971 provides the following indications *except*:** *[Karnataka 2006]*
(a) Where continuation of pregnancy endangers mother's life
(b) Where pregnancy is a result of rape
(c) When acceptors requires incentives
(d) Failure of contraceptive device

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253. Acts passed before 1980: *[PGI Dec 2007]*
(a) ESI
(b) Factory
(c) Air Protection
(d) Children's Act
(e) MTP

254. Licence to blood banks is given by: *[AIIMS May 2009]*
(a) Drugs Controller General of India
(b) Director Genera of Health Services
(c) Director General, Indian Council of Medical Research
(d) Director General, Blood Bank Services

255. What is correct for NDPS Act, 1985? *[AIPGME 2012]*
(a) Drug users sent to treatment not jail if requested
(b) Alcoholism is included in drugs
(c) Farmers allowed to grow unlimited opium
(d) Equal punishment for drug peddlers and drug users

256. Medical termination of pregnancy can be done by a registered medical practitioner if the gestation period is less than *[Recent Question 2013]*
(a) 8 weeks
(b) 12 weeks
(c) 20 weeks
(d) 24 weeks

257. Mental health act was passed in *[Recent Question 2013] [Recent Question 2014] [DPG 2006]*
(a) 1982
(b) 1987
(c) 1971
(d) 1950

258. Not included in NDPS Act is/are *[PGI November 2012]*
(a) Alcohol (b) Opium
(c) Cannabis (d) Nicotine
(e) Morphine

259. Recent mental health act in India is designated as:
(a) The Mental Health Act *[AIIMS May 2013]*
(b) The Mental Health Care Act
(c) The Mental Health Care and Rehabilitation Act
(d) The Mental Health Treatment and Rehabilitation Act

260. Which of the following in NOT included in Mental Health Care Act 2011? *[AIIMS November 2014]*
(a) Promotion of mental health and prevention of mental illness
(b) Integration of mental health care system into all levels of health care
(c) Fundamental rights of mentally retarded
(d) Minimum mental health care for all

261. Central Drugs Standard Control Organisation Zonal Offices are located all of the following places except: *[Recent Question 2014]*
(a) Mumbai
(b) Chennai
(c) Ahmedabad
(d) Jaipur

262. Naranjo algorithms is used for: *[Recent Question 2014]*
(a) Environmental factors effecting drug
(b) Parameter based data evaluation
(c) Calculating probability of adverse drug reaction
(d) Demographic factor affecting drugs action

263. Medical Termination of Pregnancy Act 1971, was amended in 2002 to include: *[Recent Question 2014]*
(a) Risk to mother's life as an indication
(b) Failure of contraception as an indication
(c) 'Mentally ill' in place of lunatic
(d) POG upto 20 weeks

264. Act(s) passed after independence in India is/are: *[PGI November 2014]*
(a) MTP act
(b) ESI act
(c) SARDA act
(d) Factory act
(e) Immunization act

265. Food Standards and Safety Authority of India comes under *[AIIMS PG May 2015]*
(a) Ministry of Consumer Affairs
(b) Ministry of Agriculture
(c) Ministry of Health and Family Welfare
(d) Ministry of Rural development

266. Regimen for Medical abortion upto 7 weeks of gestation as per Government of India guidelines includes *[UPSC CMS 2015]*
(a) 200 mg of misfepristone on D_1 followed by 800 µg of misoprostol on D_3
(b) 200 mg of misfepristone on D_1 followed by 400 µg of misoprostol on D_3
(c) 400 mg of misfepristone on D_1 followed by 800 µg of misoprostol on D_3
(d) 400 mg of misfepristone on D_1 followed by 400 µg of misoprostol on D_3

Review Questions

267. Elemental iron and folic acid contents of iron and folic acid adult tablets supplied under the "National programme for anaemia prophylaxis" are: *[Bihar 2004]*
(a) 60 mg of elemental iron and 250 µg of folic acid
(b) 100 mg of elemental iron and 500 µg of folic acid
(c) 120 mg of elemental iron and 750 µg of folic acid
(d) 200 mg of elemental iron and 1000 µg of folic acid

268. RTI act was passed in: *[Kolkata 2009]*
(a) 2004
(b) 2005
(c) 2000
(d) 2007

269. Screening test commonly used for HIV is:
(a) Western Blot *[MP 2005]*
(b) Absolute CD4 count
(c) ELISA
(d) Viral load assay

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EXPLANATIONS

REVISED NATIONAL TB CONTROL PROGRAMME

1. Ans. (b) $2(HRSZE)_3 + 1(HRZE)_3 + 5(HRE)_3$ *[Ref. Park 23/e p188]*

- *Categorization and Treatment Regimens in RNTCPQ [New Guidelines 2015-16]:*

Category	Type of patient	Regimens		Duration (months)
		IP	CP	
Cat I	New SS+ve, New SS−ve Seriously ill extra-pulmonary	$2(HRZE)_3$	$4(HR)_3$	6 months
Cat II	SS+ve relapse SS+ve failure SS+ve treatment after default	$2(HRZES)_3$ + $1(HRZE)_3$	$5(HRE)_3$	8 months
Cat IV*	MDR TB	4(KLCZEEt)	12-18 (LCEEt)	18−24 months
Cat V	XDR TB	6-12 (HhCmCzLAMP)	18 (HhCzLAMP)	24−30 months

(*Category IV - Dots Plus; Category III has been merged in Category I)

- *Letters:* R-Rifampicin, E-Ethambutol, H-Isoniazid, S-Streptomycin, Z-Pyrizinamide, K-Kanamycin, L-Levofloxacin, Et-Ethionamide, C-Cycloserine, Hh-High dose Isoniazid, Cm-Capreomycin, Cz-Clofazimine, L-Linezolid, A-Amoxy-Clav, M-Moxifloxacin, P-PAS
- *Numbers:* The numbers before letters refer to months of treatment (2 imply two months of treatment). The numbers after letters refer to frequency of administration per week (3 imply thrice per week).
- *Seriously ill extra-pulmonary TB:* Meningitis, disseminated TB, tuberculous pericarditis, peritonitis, bilateral or extensive pleurisy, spinal disease with neurological complaints, SS –ve TB with extensive parenchymal involvement, and intestinal and genito-urinary TB.

2. Ans. (d) 10,000 bacilli per ml sputum

[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p205, Park 23/e p183]

- *Zeihl Neelsen (ZN) Staining IN RNTCP:*
  - Sputum smear of a suspected TB patient is used for the diagnosis
  - Decolourizer: 25% sulphuric acid
  - Acid Fast Bacilli (AFB) of TB:'Rod shaped' with 'beaded appearance' (Beads: Mycolic Acid)
  - >10,000 bacilli per ml sputum must be present for a positive result
  - Results of ZN staining: Minimum 100 fields examined

Grading of smears	Criterion
0	No bacilli per 100 oil immersion fields
Scanty	1 – 9 bacilli per 100 oil immersion fields
1+ grading	10 – 99 bacilli per 100 oil immersion fields
2+ grading	1 – 10 bacilli per oil immersion field
3+ grading	> 10 bacilli per oil immersion field

Also Remember

New Tuberculosis Diagnosis (RNTCP) Guidelines In India (w.e.f. 01 April 2009 onwards)
Refer to Annexure 8.

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3. **Ans. (a) According to NEW GUIDELINES**
[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p180 and Park 23/e p188]

Refer to Annexure 8

4. **Ans. (b) IP – 36, CP – 66** *[Ref. Park 21/e p173, Park 22/e p175]*

- *No. of total doses given to a TB patient in RNTCP:*

Category	No. of weeks		No. of doses	
	IP	CP	IP	CP
Category I	8	18	8 × 3 = 24	18 × 3 = 54
Category II	12	22	12 × 3 = 36	22 × 3 = 66
Category IV & V	26	78	26 × 7 = 182	78 × 7 = 546

5. **Ans. (b) 2, 4 and 6 months** *[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p183 and, 8/e p209-10, Park 23/e p188]*
- *Follow-up smears examination timings:*

Category	If SS –ve at end of IP	If SS +ve at end of IP
Category I	2 m, 4 m, 6 m	2 m, 3 m*, 5 m, 7 m
Category II	3 m, 5 m, 8 m	3 m, 4 m*, 6m, 9 m
Category IV &V	once/month (IP); once/3 months (CP)	—

(*Irrespective of SS examination results, patients is started with CP treatment)

6. **Ans. (a) Annual Risk of Infection** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p196]*
- *Annual Risk of Infection (ARI):* Is the proportion of population which will be primarily infected with tuberculosis in course of 1 year
  - Is incidence of infection of TB
  - Is known as 'Tuberculin Conversion Index'
  - Best indicator of trend of TB unaffected by current control measures
  - Most informative index of magnitude of problem of TB
- *ARI (India):* 1 – 2% (average ARI = 1.5%)
  - For every 1% rise of ARI, there are 50 SS +ve cases/lac population
- *Key epidemiological indices for TB (India):*

Index	Situation in India	Remark
Incidence of Infection	1–2% (~ 1.5%)	ARI – Tuberculin Conversion Index
Prevalence of Infection	40%	Standard Tuberculin Test
Incidence of Disease	1.7 per 1000	New cases (culture +ve)
Prevalence of Disease	0.2%	Sputum positive

7. **Ans. (c) Isoniazid & Rifampicin** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p197, Park 23/e p174]*
- *Multidrug Resistant TB (MDR-TB):* Resistance to Isoniazid and Rifampicin "with or without resistance to other drugs'
  - Treatment of MDR-TB must be done on the basis of sensitivity testing
  - Directly observed therapy certainly helps to improve outcomes and should be considered an integral part of the treatment of MDR-TB.
- *Extensive Drug Resistant TB (XDR–TB):* Resistance to rifampicin and isoniazid as well as to any member of the quinolone family and at least one of the following second-line TB treatments: kanamycin, capreomycin, or amikacin
  - XDR–TB is MDR TB with further resistance to 3 – 6 classes of second line drugs (older definition)
  - Principles of treatment for MDR-TB and for XDR-TB are same.
  - XDR-TB does not transmit easily in healthy populations, yet is capable of causing 'epidemics in populations which are already stricken by HIV'
- *Management of MDR – TB (DOTS – PLUS):* Refers to DOTS programmes that add components for MDR-TB diagnosis, management and treatment
  - Initiated as Category IV pilot projects (Gujarat)
  - Target: management of 5000 new MDR – TB cases per year

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Category Type of patient		Regimens		Duration (months)
		IP	CP	
Cat IV	MDR – TB	6 (KOCZEEt)	18 (OCEEt)	18 – 24

(Letters: E – Ethambutol, Z – Pyrazinamide, K – Kanamycin, O – Ofloxacin, Et – Ethionamide, C – Cycloserine; Numbers: The numbers before letters refer to months of treatment (4 imply four months of treatment))

8. **Ans. (c) 10-15 persons per year** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p195; Park 23/e p181]*
   - Every TB sputum positive patient can infect up to 10-15 individuals in a year.

Also Remember

- TB is 'Barometer of Social Welfare in India'
- TB (AFB) Bacillus discovered by: Robert Koch
- World TB Day: 24th March
- TB was declared as 'Global emergency in 1983' by WHO
- TB is the MC Opportunistic Infection (OI) in HIV in India
- TB bacteria remain alive: in sputum for 1 day and in droplet nuclei for 10 days
- *Elimination level for Tuberculosis (WHO and STOP TB Strategy):* <1 case per million population (to eliminate TB as a public health problem)
- *TB Institutes of importance in India:*
  - National Tuberculosis Institute (NTI) – Bangalore
  - Tuberculosis Research Centre – Chennai
  - LRS Institute of TB and Respiratory Diseases – New Delhi

9. **Ans. (b) To achieve a cure rate of 85% and then to detect 70% of estimated cases** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p202, Park 23/e p427]*
   - *Objectives of Revised National Tuberculosis Control Programme (RNTCP):*
     - To achieve a cure rate of atleast 85% through administration of short course chemotherapy (SCC) and
     - To achieve a case detection rate of 70% (only after having achieved the desired cure rate).

10. **Ans. (c) 10000 acid fast bacilli per ml of sputum** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p205; Park 23/e p183]*

Also Remember

Other Tests in Tuberculosis:

- *Auramine-rhodamine stain (AR):* More sensitive than ZN staining
- *Culture (IUAT – LJ Medium/Kirchner Medium/Middlebrook 7H10 or 7H11 media):* Very sensitive; +ve even with '10 – 100 bacilli per ml sputum'
- *Chest radiography:* Findings suggestive of but not diagnostic of TB
- *Abreugraphy (Mass Miniature Radiography – MMR):* Sufficiently accurate for diagnosis of TB
- *BACTEC Radiometric System:* C14 radio-labelled with palmitic acid
  - Detect as early as 7 – 14 days
  - 95% sensitivity
- *Microscopic Observation Drug Susceptibility assay (MODS):*
  - Direct observation of TB and simultaneously yields drug-resistance
- *ELISA Test:*
  - A60 antigen
  - Nor sufficiently sensitive nor specific
  - Supportive value for diagnosis of extra-pulmonary TB
- *PCR Test (Nucleic acid amplification tests – NAAT):*
  - Detect within 1 day
  - Extremely sensitive; +ve even with '1 – 10 bacilli per ml sputum'
- *Restriction Fragment Length Polymorphism (RFLP):* Combines Southern blotting and hybridization with DNA probes
- *Fast Plaque TB (FTB):* Sputum, aspirates, pus, blood

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Contd...

  - Detect within 48 – 72 hours
  - 90% sensitivity and 100% specificity
- *Quantiferon TB Gold (QTG) (Interferon a–release assay):*
  - Detect within 3 – 5 days
  - Higher sensitivity
- *Adenosine Deaminase (ADA):*
  - Highest sensitivity in both pleural TB and TB meningitis
- *Tuberculin Test and Mantoux Test (Pirquet test or PPD Test):* Tool for detecting TB infection

11. Ans. (d) Ethambutol *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p209, Park 23/e p187]*

- *Antitubercular Drugs:*

Bactericidal drugs	Bacteriostatic drugs
Isoniazid	Ethambutol
Rifampicin	Thiacetazone
Streptomycin	Cycloserine
Pyrazinamide	PAS
Ciprofloxacin	Ethionamide
Ofloxacin	
Kanamycin	

12. Ans. (c) Streptomycin *[Ref. RNTCP Technical Guidelines for Tuberculosis Control, DGHS; p16]*

- Pregnant women with active TB: Should start or continue their anti-TB treatment
- Streptomycin should not be given during pregnancy as it crosses the placenta and may cause damage to the fetus (ototoxicity)
- Breast feeding of infants should continue irrespective of the TB status of mother
  - If mother SS +ve: Chemoprophylaxis to child for 3 months, then
    1. If child is Tuberculin –ve: Vaccinate child with BCG
    2. If child is Tuberculin +ve: Chemoprophylaxis continued for a total duration of 6 months
  - If mother SS –ve: Vaccinate child with BCG (No chemoprophylaxis)

13. Ans. (b) Red-green colour blindness

[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p211; Park 23/e p187]

- Ethambutol may cause 'optic neuritis' (ocular toxicity):
  - It may lead to 'red-green color blindness'
  - Patients may thus develop 'blue vision'
  - Thus it is contraindicated in children < 6 years age, as they may not be able to report any deterioration of color vision
- Ethambutol may also cause peripheral neuropathy and arthralgia
- Ethambutol is a bacteriostatic against actively growing TB bacilli

14. Ans. (d) Ethambutol *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p209]*

- Ethambutol may cause 'optic neuritis' (ocular toxicity): It may lead to 'red-green color blindness' and patients may thus develop 'blue vision'
- Thus it is contraindicated in children < 6 years age, as they may not be able to report any deterioration of color vision

15. Ans. (c) Failure case *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p202 and Park 23/e p180]*

- Failure: A person on treatment who is SS +ve at or after 5 months of treatment
- A failure case is given treatment in DOTS category II (RNTCP) for 8 months; start treatment from Day 1 of Cat II, whenever patient is labeled as a failure case
  - Intensive Phase $(2(HRZES)_3 + 1(HRZE)_3)$
  - Continuation Phase $(5(HRE)_3)$

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- Failure Cases in Dots Categories in RNTCP:
  - Failure cases in DOTS Cat I (RNTCP):

Patients	Follow up sputum smear results			Failure case
	End of 2m	End of 4m	End of 6m	
Patient 1	–	–	–	NO
Patient 2	–	–	+	YES
Patient 3	–	+	+	YES
Patient 4	–	+	–	NO

  - Failure cases in DOTS Cat II (RNTCP):

Patients	Follow up sputum smear results			Failure case
	End of 3m	End of 5m	End of 8m	
Patient 1	–	–	–	NO
Patient 2	–	–	+	YES
Patient 3	–	+	+	YES
Patient 4	–	+	–	YES

16. **Ans. (c) Category I, start 2 (RHZE)$_3$** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p202; Park 23/e p188]*
New Case: A TB case who has never taken treatment or took it <4 weeks.

17. **Ans. (a) Short-term treatment under supervision** *[Ref. Park 21/e p172, Park 23/e p188]*
- *Directly Observed Treatment Short Course (DOTS):* Is a community based Tuberculosis treatement and care strategy which combines the benefit of supervised treatment with community based care and support.

18. **Ans. (c) Hemoptysis** *[Ref. Park 21/e p392, Park 22/e p396]*
- *Sputum examination under TB programme is done when patient presents with:*
  - Cough more than 2 weeks
  - Fever with an evening rise
  - Hemoptysis
  - Unexplained weight loss
  - Reduced appetite

19. **Ans. (b) DOTS applied; (e) It has replaced NTP** *[Ref. Park 21/e p390-95, Park 22/e p394, 99]*

20. **Ans. (a) Active case finding; (c) X-ray is diagnostic; (d) Drugs given daily** *[Ref. Park 23/e p427]*

21. **Ans. (a) 4 drugs for 2 months and 2 drugs for 4 months; (e) Directly observed** *[Ref. Park 23/e p188]*

22. **Ans. (a) Active case finding** *[Ref. Park 21/e p390-95, Park 22/e p394, 99]*

23. **Ans. (a) and (c) Drugs are given on supervision and Intermitten regimen used.** *[Ref. Park 23/e p188, 427]*

DOTS

- DOTS is directly observed treatment short course.
- In DOTS during the intensive phase of treatment a health worker are other trained person watches as the patients swallows the drugs in his presence.
- During continuation phase the patient is issued medicine for one week in multiblister combipack of which the first dose is swallowed by the patient in the presence of health worker or trained person.
- The consumption of medicine in the continuation phase is also checked by return of empty multiblister combipack when patient come to collect medicine for the next week.
- In this programme attemate day treatment is used.
- Patient compliance is critically important throughout the prescribed period of treatment. All other consideration are secondary.

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- Drugs are given category wise, same regimen is not given to all patient.
- Streptomycin is given in category II only.
- In category-1 new sputum smear, positive cases sputum examination is done in 2, 4 and 6 months.

24. **Ans. (a) Rx under supervision; (d) Intermittent regimen** *[Ref. Park 23/e p188, 427]*

25. **Ans. (b) Start Category I immediately**
[Ref. RNTCP Technical Guidelines for Tuberculosis Control, DGHS; p16; Park 21/e p173-75, Park 23/e p188]

26. **Ans. (a) Start Cat I treatment immediately** *[Ref. RNTCP Guidelines Document]*
In the given question, a pregnant female in first trimester came with sputum positive TB.
Since ATT is safe in pregnancy (EXCEPT streptomycin) and she is sputum positive, start Cat I treatment immediately

27. **Ans. (b) Use separate vessels** *[Ref. K. Park 21/e p119, 172-75, Park 23/e p187]*

Domiciliary Treatment

- Domiciliary/Ambulatory treatment: Self-administration of (oral) drugs by patients themselves without recourse to hospitalization
- Studies have shown that 'hospital treatment has no advantage over domiciliary treatment'
- Guidelines for patients on domiciliary treatment:
  - Collect drugs regularly
  - Dispose sputum safely (burning/5% cresol/boiling/autoclaving)
  - Report to PHC if new symptoms arise

28. **(b) 450 mg** *[Ref. RNTCP Document, GOI]*
- Thrice weekly dosages of Antitubercular drugs in RNTCP:
  - Pyrazinamide: 35 mg/kg (1500 mg)
  - Isoniazid: 10 mg/kg (600 mg)
  - Rifampicin: 10 mg/ kg (450 mg; 600 mg IF weight >60 kg)
  - Ethambutol: 30 mg/kg (1200 mg)
  - Streptomycin: 15 mg/kg (750 mg)

29. **Ans. (a) 1 out of 2 samples positive** *[Ref. K. Park, 23/e p182]*

30. **Ans. (a) Decrease in resistance by mutation** *[Ref. K. Park, 22/e p173]*

31. **Ans. (a) 1 out of 2 sputum positive** *[Ref. K. Park, 23/e p182]*

32. **Ans. (a) Recently abolished; (c) Given for 6 months** *[Ref. K. Park, 23/e p188]*

33. **Ans. (a) To avoid emergence of persistors** *[Ref. K. Park, 23/e p188]*

34. **Ans. (a) Active** *[Ref. K. Park, 23/e p188]*

35. **Ans. (b) Passive** *[Ref. K. Park, 22/e p170]*

36. **Ans. (a) Rifampicin; (b) Any one Fluoroquinolone; (c) INH; (d) Kanamycin** *[Ref. Park, 23/e p192]*

37. **Ans. (d) Mycolic acid** *[Ref. Short Textbook of Medical Microbiology by Satish Gupte, 1/e p153]*

38. **Ans. (c) Non-DOTS based therapy** *[Ref. Park, 22/e, p177]*

Review Questions

39. **Ans. (c) Cannot prevent disease in infected person** *[Ref. Park 23/e p198]*

40. **Ans. (c) Resistant tuberculosis** *[Ref. Harrison 16/e p963]*

41. **Ans. (b) Category II** *[Ref. Park 23/e p188]*

42. **Ans. (c) Streptomycin** *[Ref. Park 23/e p186]*

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43. **Ans. (b) Achievements of high cure rates through DOTS** *[Ref. Park 23/e p427]*

44. **Ans. (b) 2 $(HRZES)_3$. 1$(HRZE)_3$, 5$(HRE)_3$** *[Ref. Park 23/e p188]*

45. **Ans. (b) Directly observed** *[Ref. Park 23/e p188]*

46. **Ans. (c) RMP + INH + PZM + ETM** *[Ref. Park 23/e p188]*

47. **Ans. (c) Not involving NGO's in RNTCP** *[Ref. Park 23/e p427]*

48. **Ans. (a) Catergory I** *[Ref. Park 23/e p188]*

49. **Ans. (b) Chest X-ray (New Guidelines: start ATT)** *[Ref. Park 20/e p367]*

NATIONAL POLIO ELIMINATION – PROGRAMME

50. **Ans. (a) All children between 0—5 years of age on a single day, irrespective of their previous immunization status**
[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p152 and Park 23/e p207]

Pulse Polio Immunization (PPI) Programmeme in India

- Launched in India: 1995–96 (1st round on 9th Dec 1995 and 20th Jan 1996)
  - First PPI targeted children < 3 years age
  - Later on WHO recommended age group be 0-5 years (1996-97)
- Meaning of 'Pulse': Sudden, simultaneous mass administration of Oral Polio Vaccine (OPV) on a single day to 'all children 0–5 years age', irrespective of their previous immunization status
  - PPI replaces wild virus with vaccine virus from the community
  - PPI is over and above routine immunization.

51. **Ans. (c) 60 days of onset of paralysis** *[Ref. Surveillance of Acute Flaccid Paralysis – Field Guide, MoHFW, 2/e p9]*
- 60-day follow-up in a case of Acute Flaccid Paralysis (AFP): The District Immunization Officer (DIO) must visit every case of AFP 60 days after onset of paralysis 'to confirm the presence or absence of residual weakness'
  - Activity completed before 70th day
- *Minimal levels of residual weakness can usually be detected by:*
  - Mid-arm or mid-thigh circumference: reveal wasting on one side.
  - Asymmetry in the skin folds on medial aspects of thigh.

Also Remember

- All reported cases of AFP should be investigated by DIO 'within 48 hours' after notification
- 2 stool samples, atleast 24 hours apart, are collected within 14 days of onset of paralysis (maximum within 8 weeks)
- *Outbreak response immunization (ORI):* Following the AFP case investigation and stool specimen collection, ORI is organized in the community and performed as soon as possible
  - Children aged 0-59 months are given one dose of OPV regardless of previous immunization (in the village/locality of the AFP case)
  - The travel history of the child with AFP may suggest additional places of stay where ORI should also be conducted
- *Active case search in the community:* In the community where an AFP case resides or where an AFP case has visited during the incubation period for polio (4-25 days before paralysis onset), a house-to-house active case search is conducted to find additional AFP cases that may have occurred
  - This activity is carried out immediately along with ORI
  - A search is conducted for any children <15 years who have had the onset of AFP within the preceding 60 days
  - All cases that are found are investigated immediately, with collection from the case of two stool specimens before administration of OPV.

52. **Ans. (d) Adequate stool specimens should be taken from 100% AFP** *[Ref. WHO Field Guide for supplementary activities aimed at achieving polio eradication, Geneva 1997; Park 23/e p203]*
WHO Indicators of AFP Surveillance and Lab Performance:

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Two most critical indicators:

- Non-polio AFP rate in children < 15 years of age (Target > 1/100,000): The non-polio AFP rate is an indicator of surveillance sensitivity; If it is < 1/100,000 then the surveillance system is probably missing cases of AFP
- Reported AFP cases with 2 stool specimens collected < 14 days since paralysis onset (Target > 80%)

53. Ans. (c) 0-15 years *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p153; Park 23/e p203]*

- Acute Flaccid Paralysis (AFP) Surveillance is used to identify reservoirs of wild poliovirus transmission in National Polio Surveillance Project
  - Acute: rapid progression from onset to maximum paralysis
  - Flaccid: loss of muscle tone, floppy – as opposed to spastic or rigid
  - Paralysis: weakness, loss of voluntary movement
- *Acute Flaccid Paralysis (AFP):* Any child less than 15 years age who has sudden onset of flaccid paralysis or paralytic illness in a person of any age when polio is suspected
- *AFP Surveillance Indicators (WHO):*

Indicator	Target
Non-polio AFP rate in < 15 years of age	> 1/100,000
Completeness of weekly zero reporting	> 90%
Timeliness of weekly zero reporting	> 80%
Reported cases investigated < 48 hours of report	> 80%
Reported cases 2 stool specimens < 14 d since paralysis onset	> 80%
Reported AFP cases follow-up atleast 60 d after paralysis onset	> 80%
Specimens arriving at national laboratory < 3 days of being sent	> 80%
Specimens arriving at the laboratory in 'good condition'	> 80%
Specimens with a turn-around time < 28 days	> 80%
Stool specimens from which a non-polio enterovirus is isolated	> 10%

54. Ans. (b) 60 days *[Ref. K. Park 23/e p203]*

55. Ans. (c) 0-5 years *[Ref. K. Park 23/e p209]*

56. Ans. (d) To identify high risk population *[Ref. K. Park 23/e p209]*

57. Ans. (d) 90 days *[Ref. Red Book: Field Immunization Guide, NPSP GOI document]*

Review Questions

58. Ans. (b) Live *[Ref. Park 23/e p206-207]*

59. Ans. (d) 30 days follow up examination *[Ref. Park 23/e p203-204]*

RCH PROGRAMME

60. Ans. (d) Tuberculosis *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p135-36, Park 23/e p459-460]*

Integrated Management of Neonatal and Childness illness (IMNCI):

- IMNCI is a 'strategy for reducing morbidity and mortality associated with major causes of childhood illness'
  - *Curative component includes management of:*
    1. Diarrhoea
    2. Measles
    3. Pneumonia
    4. Malaria
    5. Severe malnutrition and nutritional counseling
- *Case management process:* Is presented in a series of charts (**Mnemonic: A** Case **I**s **T**reated & **C**are **G**iven)
  - **A**ssess the young infant or child
  - **C**lassify the illness
  - **I**dentify the treatment

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- Treat the infant or child
- Counsel the mother
- Give follow-up care

Also Remember

- IMNCI is the Indian adaptation of IMCI (Integrated Management of Childhood Illness); major highlights of Indian adaptation are,
  - Inclusion of early neonatal age (0 – 7 days age) in programme
  - Incorporating national guidelines on malaria, anemia, Vitamin-A supplementation and immunization schedule
  - Training of health workers begin with sick young infants up to 2 months
  - Proportion of training time devoted to sick young infant and sick child is almost equal
  - Is skill based

61. Ans. (c) Reduce the under five mortality to half *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p202; Park 23/e p453]*

- *Components of Reproductive and Child Health Programme:*
  - Community Needs Assessment Approach (CNAA)
  - Integrated packages of services for mother and child
  - MTP services at PHC and safe abortion
  - Control and prevention of RTI/STI
  - Adolescent health
  - Services in urban slums
  - Improving quality of services
  - Unmet needs and sub-centre action plans
  - Communication strategy
  - Gender sensitiveness
  - Greater involvement of Panchayati Raj Institutions (PRIs), NGOs and community.

62. Ans. (b) Clean towel & Clean water for hand washing

[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p161]

- *'Five cleans' (practices) under strategies for elimination of neonatal tetanus include,*
  - Clean delivery surface
  - Clean hands (of birth attendants)
  - Clean cord cut (blade or instrument)
  - Clean cord tie
  - Clean cord stump (no applicant)
- *Suggested 'Seven cleans' include five cleans and*
  - Clean water, and
  - Clean towel, for hand washing.

Also Remember

- *Procedures undertaken to ensure 5 cleans:*
  - Clean delivery surface: A clean plastic sheet
  - Clean hands: Soap and clean water
  - Clean cord cut: A new razor blade
  - Clean cord tie: A clean piece of thread
  - Clean cord stump: Nothing to be applied to cord
- *Sometimes these practices are called as '3 cleans':*
  - Clean delivery surface
  - Clean hands
  - Clean cord care (cut, tie and stump)
- *Neonatal Tetanus Elimination:*
  - Rate < 0.1 per 1000 LB
  - Attended deliveries > 75%
  - TT2 coverage > 90%

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63. **Ans. (c) 65%** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p115]*
    - *Couple Protection Rate (CPR):* Is defined as the percent of eligible couples protected against childbirth by one of the approved methods of family planning, i.e. condoms, oral pills, IUDs or sterilization
    - CPR is an indicator of 'contraceptive prevalence in a community'
    - Demographers believe that 'NRR = 1 can be achieved only with CPR > 60%': Thus goal under the earlier National Population Policy was CPR 60% by 2000.

Also Remember

- *Goals for CPR:*

Policy	Goal for CPR
NRHM (2005 – 12)	63%
RCH – II (2004 – 09)	65%
NPP 2000 (by 2010)	Meet 100% needs

64. **Ans. (a) 20 mg iron & 100 micrograms folic acid** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p413]*
    - *Iron and Folic Acid content per IFA tablet:*
      - *Adult tablet:* 100 mg elemental iron and 500 mcg folic acid
      - *Pediatric tablet:* 20 mg elemental iron and 100 mcg folic acid

65. **Ans. (c) Sick neonates are preferred over sick older children; (d) Treatment is aimed...** *[Ref. K Park 20/e p387,495-96; Park 21/e p414, Park 23/e p459]*

66. **Ans. (a) Remove CuT only** *[Ref. K. Park 21/e p461, Park 23/e p499]*
    Pregnancy with IUD-IN-SITU:
    - If women requests termination of pregnancy: Legally induced abortion should be carried out
    - If women wishes continuation of pregnancy + threads are visible: Remove IUD by gently pulling the threads
    - If women wishes continuation of pregnancy + threads are NOT visible: Carefully examine for anycomplication; If there are sign of intrauterine infection and sepsis, evacuation of the uterus under broad spectrum antibiotic cover is mandatory.

67. **Ans. (c) >50/min** *[Ref. K. Park 23/e p170-171]*

68. **Ans. (b) Treatment of STD** *[Ref. K. Park 23/e p453]*

69. **Ans. (b) Subcenter** *[Ref. K. Park, 22/e p416]*

70. **Ans. (b) CSSM plus family planning** *[Ref. K. Park, 23/e p453]*

71. **Ans. (b) Female clients should be below the age of 45 years and above the age of 20 years** *[New Sterilization Guidelines, Government of India, 2006 document]*

72. **Ans. (c) Green** *[Ref. K. Park, 23/e p460]*

73. **Ans. (c) Feed to malnourished children** *[Ref. K. Park, 23/e p454-455]*

74. **Ans. (d) All of the above** *[Ref. K. Park, 23/e p452-453]*

75. **Ans. (a) Upto 5 yrs** *[Ref. K. Park, 23/e p456, 459]*

76. **Ans. (c) District level household survey** *[Ref. DLHS, RCHIPS, MOHFW, GOI 2015]*

    DISTRICT LEVEL HOUSEHOLD AND FACILITY SURVEY (DLHS), MOHFW
    - *Sample size*: 7 lakh households covering all districts of India
    - *Importance*: Provide district level estimates on health indicators to assist policy makers and programme administrators in decentralized planning, monitoring and evaluation
    - Main objective of the survey was to estimate the service coverage of the following:
      - Ante Natal Care (ANC) and Immunization services
      - Extent of safe deliveries
      - Contraceptive prevalence
      - Unmet need for family planning
      - Awareness about RTI/STI and HIV/AIDS
      - Utilization of government health services and users' satisfaction

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- *Frequency*: Once every 5 years
  - *DLHS-1*: 1998-99
  - *DLHS-2*: 2002-04
  - *DLHS-3*: 2007-08
  - *DLHS-4*: 2012-13
- *DLHS-3 Key Data India*:
  - *Literacy rate*: 72%
  - *Mean household size*: 5.1
  - *Improved source of drinking water*: 84%
  - *Mean age of marriage*: 24 years (Boys), 19.8 years (Girls)
  - *Family planning usage*: 54%
  - *Unmet need for Family planning*: 21.3%
  - *Institutional delivery*: 47%
  - *Fully immunize children (12-23 months)*: 54%
  - *Exclusive breast feeding*: 47%

77. Ans. (a) Hemoglobin level *[Ref. RCH II Programme Document, MOHFW Government of India]*

RCH ESSENTIAL OBSTETRIC CARE (NRHM)

- Essential Obstetric Care: Prevention and treatment of anemia, institutional / safe delivery services and post natal care
- Quality Ante Natal care: Minimum of at least 4 ANCs including early registration and 1st ANC in first trimester along with physical and abdominal examinations, Hemoglobin estimation and Urine investigation (Protein & Sugar) , 2 doses of TT Immunization and consumption of IFA tablets

78. Ans. (b) Janani Shishu Suraksha Karyakram *[Ref. Park 23/e p456]*

- Under JSSK, just like provision of services to Mothers, their sick newborns accessing public health institutions for treatment, have been given similar entitlements till 30 days after birth

Review Questions

79. Ans. (d) All *[Ref. Many sites and journal articles]*

80. Ans. (a) Co-trimoxazole *[Ref. Park's 23/e p172]*

81. Ans. (c) Two tablets twice daily *[Ref. Park's 23/e p172]*

82. Ans. (d) 400 mcg *[Recent Guidelines: 500 mcg; Park 23/e p453]*

NATIONAL BLINDNESS CONTROL PROGRAMME

83. Ans. (c) Tertiary level *[Ref. Park 23/e p440]*

Refer to theory.

84. Ans. (b) Low vision *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p422; Park 23/e p401]*

- WHO defines Blindness as 'visual acuity of <3/60 in better eye with best possible correction'
- National Programme for Control of Blindness (NPCB), India defines Blindness as 'visual acuity of <6/60 in better eye with best possible correction'
- *Comparison of WHO and NPCB definitions:*

WHO – ICD	Visual Acuity	NPCB, India
Low Vision		
Category 1	<6/18 – 6/60	Low Vision
Category 2	<6/60 – 3/60	Economic Blindness
Blindness		
Category 3	<3/60 – 1/60	Social Blindness
Category 4	<1/60 – PL+	Manifest Blindness
Category 5	PL–	Absolute Blindness

(PL+: Perception of Light; PL–: No perception of light)

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Also Remember

- *Prevalence of Blindness (World):* 0.6% (Visual acuity <3/60) (2002)
- *Causes of Blindness in World:*
  - Cataract (48%)
  - Uveitis (10%)
  - Trachoma
  - Diabetic Retinopathy
  - Glaucoma (12%)
  - ARMD
  - Corneal opacity
  - Others
- *Prevalence of Blindness (India):* 1.05% (Visual acuity <6/60) (2007)
- *Causes of Blindness in India:*
  - Cataract – MCC of Blindness in India (62.6%)
  - Glaucoma
  - Corneal opacity
  - Refractive Error (19.7%)
  - Posterior segment pathology
  - Other causes
- *Goal for Blindness in National Health Policy (NHP) 2002:* Reduce prevalence of Blindness to 0.5% by 2010 [New GOAL 0.3% by 2020]
- About 80% of blindness is avoidable
- *Legal Blindness:* Visual acuity <6/60 (<20/200) OR Visual field <20° in better eye with best possible correction
- *Work Vision:* <6/60 (Economic Blindness)
- *Walk Vision:* <3/60 (Social Blindness)

85. Ans. (d) Visual acuity < 3/60 in the better eye with best correction *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p422, Park 23/e p401]*

86. Ans. (c) Visual acuity < 6/60 in the better eye with best correction *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p422]*

87. Ans. (b) 6/9 *[Ref. The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 2002; p119]*

- WHO defines Blindness as 'visual acuity of <3/60 in better eye with best possible correction'
- National Programme for Control of Blindness (NPCB), India defines Blindness as 'visual acuity of <6/60 in better eye with best possible correction'

88. Ans. (b) To shift from fixed facility surgical approach to eye camp approach *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p425 Park 23/e p439]*

- **Revised strategies of NPCB:**
  - To make NPCB more comprehensive by,
    1. Strengthening services for other causes of blindness like corneal blindness and refractive errors in school children
    2. Improving followup services of cataract operated persons
    3. Treating other causes of blindness like glaucoma.
  - To strengthen participation of voluntary organizations
  - To shift from eye camp approach to fixed facility surgical approach
  - To enhance coverage of eye services in tribal & underserved areas
  - To expand World Bank project activities
    1. Construction of dedicated eye OTs and eye wards
    2. Training of eye surgeons
    3. Modern cataract surgery
    4. Supply of ophthalmic equipment.

89. Ans. (d) NGO organized screening camps followed by surgery at base hospital *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p425]*

- *The unit cost of providing cataract surgery in India in:*
  - Private Hospital: ₹ 5331/- (Least Cost Effective)
  - NGO Hospital: ₹ 4977/-
  - Governemnt camps: ₹ 2143/-
  - NGO organized screening camps followed by surgery at base hospital: ₹ 1128/- (MOST COST EFFECTIVE)
- *MCC of Blindness (World):* Cataract (48%)
- *MCC of Blindness (India):* Cataract (77%)
- *MCC of Low Vision (India):* Cataract (77%)
- *Minimum target for cataract surgery rate in India:* 400 per lac population per year.

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90. Ans. (c) A-IV, B-I, C-III, D-II *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p422]*

91. Ans. (b) 6/60 *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p429]*

Also Remember

- *Types of blindness based on causes:*
  - Type I: Blindness caused by obvious lesions of cornea (Preventable)
  - Type II: Blindness caused by lens opacities (Curable)
  - Type III: Blindness caused by other known or identified causes
  - Type IV: Blindness caused by undetermined or unspecified causes.
- *Blindness in India:*
  - India is single largest contributor to global blind pool
  - *Measured according to:* NPCB criterion (<6/60 in BEBPC)
  - Total estimated no. of blind persons: 15 million
  - *Current prevalence:* 1.05% (2007)
  - *State with highest prevalence of blindness:* Jammu & Kashmir
  - State with lowest prevalence of blindness: Meghalaya
  - *Prevalence after correction:* 0.56% (2001–02)
  - *Prevalence of blindness in age >50 years:* 8.5%
  - *Prevalence of one-eyed blindness:* 0.8% (MCC: Cataract – 73%)
  - India is 'overestimating the no. of blinds as per WHO definition'
  - If WHO cutoff (<3/60 in BEBPC) is employed in India, estimated prevalence of blindness would be: 0.7%
  - Blindness in India includes: Economic Blindness, Social Blindness, Manifest Blindness and Absolute Blindness (WHO blindness includes Social Blindness, Manifest Blindness and Absolute Blindness)
  - MCC of Blindness (India): Cataract (63%).

92. Ans. (d) Glaucoma *[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p368 and The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 2002; p234-45]*

- *Vision 2020 – The Right To Sight:* A global initiative by WHO and International NGOs to reduce avoidable (preventable and curable) blindness by 2020.

Global Vision 2020 (5 diseases)	Indian Vision 2020 (7 diseases)
Cataract	Cataract
Refractive errors and low vision	Refractive errors and low vision
Childhood blindness	Childhood blindness
Trachoma	Focal trachoma
Onchocerciasis	Glaucoma
	Diabetic retinopathy
	Corneal blindness

93. Ans. (d) Xerophthalmia *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p428, Park 21/e p403]*

Also Remember

- *World Sight Day:* 2nd Thursday of October.

94. Ans. (a) Cataract *[Ref. The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 2002; p158]*

- *MC cause of blindness in India:* Cataract
- Cataract is included among target diseases in Vision 2020 (both Global and Indian)
- National Programme for Control of Blindness (NPCB) was started in 1976 as a 100% centrally sponsored scheme
- Strategies of NPCB include establishing 'one eye care facility per 5 lac persons'
- Rate of cataract surgery required to clear backlog of cataract blindness in India: 400 operations per lac population
- *Other externally-aided projects in NPCB:*
  - DANISH assistance to NPCB (Manpower development, Establishment of management system at state level, Establishment & development of monitoring and evaluation system, Preparation of health education material, teaching and information aids, Training)

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- WHO assistance to NPCB: (Intra-country fellowships in ophthalmology and pediatric ophthalmology, Pilot survey on childhood blindness (Delhi), Training in district programme management, Development of plan of action for 'Vision 2020', High quality workshops for eye care for faculty of medical colleges, Situational analysis on eye care infrastructure and human resources)

95. Ans. (a) School teachers *[Ref. K. Park 19/e p361 and The Principles and Practice of Community Ophthalmology, NPCB, Govt. of India, 2002; p119, Dr. J. Kishore, 8/e p119]*

96. Ans. (a) 3/60 and 1/60 *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p422, 20/e p349]*

97. Ans. (a) Age group screened is 5-10 years *[Ref. The Principles and Practice of Community Ophthalmology, NPCB,Govt. of India, 2002; p119 and K. Park 20/e p376]*

98. Ans. (b) Trachoma *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p428-29]*

- WHO has recommended '**SAFE** Strategy' for global elimination of blinding trachoma in the remaining countries
  - **S**urgery
  - **A**ntibiotic use
  - **F**acial cleanliness
  - **E**nvironmental improvement.

Also Remember

- *Blinding trachoma:* Is found in countries with prevalence of blindness >0.5%. Is indicated by the presence of,
  - Corneal blindness
  - Trachomatous trichiasis and entropion
  - Moderate and severe trachomatous inflammation
- *Mass (Blanket) treatment of trachoma:*
  - Given where prevalence of moderate and severe trachoma in 0 – 10 years age group is >10%
  - Treatment consists of 1% tetracycline (for 5 consecutive days each month or once daily for 10 days each month for 6 consecutive months, or for 60 days) or alternatively erythromycin
- *WHO recommended strategy for measles elimination:* 'Catch up – Keep up – Follow up strategy'
- *WHO recommended strategy for polio eradication:* 'PULSE strategy'.

99. Ans. (c) 100% coverage of vitamin A prophylaxia doses from 9 months to 3 years age *[Ref. Vision 2020 document, NPCB, Govt of India]*

- *Targets for X five year plan under vision 2020.*
  - Increase cataract surgery rate to 450 operations per one lac population
  - Improve visual outcome (>6/18) after cataract surgery in 80%
  - Intra-ocular lens implantation in > 80% of cataract surgery cases
  - Development of 50 paediatric ophthalmology units in tertiary care hospitals.
  - Screen known diabetics for diabetic retinopathy
  - Screen for glaucoma for those > 35 years attending eye clinics
  - Basic refraction services available in all districts
  - 4000 vision centres manned by trained optometrist/Refractionist/Ophthalmic Assistant
  - Low vision centres at 50 centres of excellence/tertiary centres
  - 25 fully functiona, accredited safe eye banks
  - MMR replace Measles vaccine, coverage >60
  - 75% coverage for regular vitamin A supplementation (till 5 years age)

100. Ans. (a) UNICEF *[Ref. www.who.int]*

101. Ans. (d) 20000 *[Ref. K Park, 23/e p440]*

- Proposed Structure for Vision 2020, NPCB:
  - Vision centres 20,000 (Primary level)
  - Service centres 2,000 (Secondary level)
  - Training centres 200 (Tertiary level)
  - Centres for Excellence 20 (Tertiary level)

102. Ans. (a) Surgery *[Ref. Vision Rehabilitation, 1/e p47]*

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103. Ans. (c) Sentinel surveillance *[Ref. NPCB Document, GOI]*

- 25 Sentinel surveillance units have been established in Departments of Ophthalmology and PSM in Medical Colleges in India for assessment of,
  - Beneficiary profiles
  - Visual outcomes based on cataract surgery records
  - Follow-up of operated cases
  - Ocular morbity data

104. Ans. (d) 500,000 *[Ref. K. Park, 23/e p440]*

105. Ans. (c) 50000 *[Ref. Postgraduate Ophthalmology by Chaudhuri, Volume 1, 1/e p15]*

106. Ans. (c) District collector *[Ref. Park, 22/e p406; Guidelines for State Health Society and District Health Society, NPCB document, 11th FYP 2009, Pg 6]*

- Composition of District Blindness Control Society (DBCS)/ District Health Society: 15 members (7 member team plus 8 ex-officio members)

Chairman	District Collector/ District Mission Director
Vice-Chairman	Chief Medical & Health Officer/ District Health Officer
Member Secretary	District Programme Manager (Deputy CMO Ophthalmologist)
Technical Advisor	Chief Ophthalmic Surgeon of District hospital/ HOD Ophthalmology
Other members	Medical Superintendent/ Civil Surgeon of District Hospital/ District Education Officer Representatives from NGOs/ District Mass media (IEC) officer Prominent practicing eye surgeons

107. Ans. (d) Giving 1000 Rupees per Cataract surgery to NGO [Ref. NPCB, XI FYP Document, Planning Commission, GOI]

NEW INITIATIVES IN NPCB 11TH FIVE YEAR PLAN (2007-12)

- Dedicated Eye Wards and Eye OTs in District hospitals & Sub Districts Hospitals
- Ophthalmic Surgeons and Ophthalmic Assistants in New districts DHs & SDHs
- Ophthalmic Assistants in PHCs/ Vision Centers
- Eye Donation Counselors in Eye Banks
- Telemedicine in Ophthalmology (Eye Care Management Information and Communication Network)
- Involvement of Private Practitioners in Sub District, Blocks and Village Level
- Mobile Ophthalmic Units in NE States, Hilly States
- Clear Cataract Backlog
- Grant-in-aid for NGOs:
  - ₹ 750 per case for Cataract/IOL Implantation Surgery (850/- in NE, Hilly, Deserts)
  - ₹ 1000 per case of other Major Eye Diseases (1100/- in NE, Hilly, Deserts)

Review Question

108. Ans. (c) Tertiary care *[Ref. Park 21/e p402, Park 22/e p406]*

NATIONAL HIV/AIDS CONTROL PROGRAMME

109. Ans. (b) Providing ART to 3 million people by 2005 *[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p234 and K. Park 20/e p299]*

- 3 by 5 Target: Announced by WHO and UNAIDS on December 1, 2003
  - *Interim target:* Providing anti-retroviral treatment (ART) to '3 million people living with HIV/AIDS (PLHA)', in developing countries (low & middle income), by end of 2005
  - *Ultimate goal:* Universal access to ART to anyone who needs it
  - *Focus areas: (Five pillars)*
    1. Simplified standard tools to deliver ART
    2. A new service to ensure effective, reliable supply of medicines and diagnostics
    3. Dissemination and application of new knowledge and successful strategy
    4. Urgent, sustained support to countries
    5. Global leadership, backed by strong partnership.

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110. Ans. (c) 3 *[Ref. Project document: National AIDS Control Programme – II, NACO]*

- *Under National AIDS Control Programme (India):*
  - *Screening of HIV:* E/R/S
    1. ELISA (E) Test
    2. RAPID (R) Test
    3. SIMPLE (S) Test
  - *Confirmatory diagnosis of HIV:* Western Blot Assay
- *Screening of HIV:*
  - *Strategy I:* One out of three screening tests (E/R/S) are used
    1. Done for screening every blood unit before transfusion
    2. Does not recommend its use for diagnosis of HIV in a person
  - *Strategy II:* Two out of three screening tests (E/R/S) are used
    1. Done for screening person who is symptomatic with any one of AIDS defining illness (NACO guidelines)
  - *Strategy III:* All three screening tests (E/R/S) are used
    1. Done for screening person who is asymptomatic

111. Ans. (b) Transfusion of blood/ blood products *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p237; Park 21/e p321, Park 22/e p320]*

- *Risk of HIV transmission through different modes (Efficiency of routes):*

Route of transmission	Efficiency
Sexual	0.01 – 1%
Blood and blood products transfusion	> 90%
Sharing needle/syringes	0.1 – 0.3%
Mother to child transmission (MTCT)	25 – 30%
Per-cutaneous exposure	0.4%
Muco-cutaneous exposure	0.05%

- AIDS is known as 'Slim's Disease' in Africa
- *Risk of Mother to child transmission (MTCT) of HIV:*
  - Developing countries: 30%
  - Developed countries: 25%
- *Risk of HIV transmission with prolonged breast feeding:* 12 – 15%
- *Risk of HIV transmission in presence of other STD:* Increases 8 – 10 times.

112. Ans. (d) HIV/ AIDS *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p271]*

- Since 1987, more than 30 HIV candidate vaccines have been tested in Clinical trials Phases I/II; Some of them are: **[Mnemonic: CRAMS]**
  - AIDSVAX (gp 120 based vaccine): only vaccine in Phase III trials
  - **C**ytotoxic T-Lymphocytes (CTL) Inducing vaccine
  - **R**ecombinant adeno- associated virus (rAAV) vaccine
  - **M**odified Vaccinia ankara (mVA) vaccine
  - **S**ubunit vaccine

113. Ans. (d) Industrial workers *[Ref. K. Park 20/e p373; Park 23/e p436]*

Targeted Interventions in NACP

- *Basic purpose:* To reduce transmission of HIV amongst most vulnerable populations
- *Approach:* Combines a comprehensive and integrated approach to vunerable segments of population
  - Main activities:
  - Behaviour change

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- Communication
- Treatment of STD
- Create enabling environment to facilitate behaviour change.

Segments of population covered:

- Sex workers
- Injecting Drug Users
- Truckers
- Homosexual men (MSM-Men having sex with men)
- Migrant labourers
- Street children

114. Ans. (b) Opt-out testing *[Ref. HIV testing guidelines, CDC Atlanta]*

- *Opt-in testing:* testing is offered and the patient is required to actively give permission before it can occur
- *Opt-out testing:* means performing an HIV test after notifying the patient that the test is normally performed, but that the patient may elect to decline or defer testing; assent is then assumed unless the patient declines testing
- WHO and CDC recommends opt-out testing policies in health care settings
- Opt- out testing has a higher (85-98%) testing rate than opt- in testing (25-83%)
- It does NOT eliminate the need for informed consent.

115. Ans. (b) Zidovudine and (c) Nevirapine *[Ref. K. Park 23/e p434]*

116. Ans. (b) Estimation of total cases in hospitals *[Ref. Park 23/e p433]*

Sentinel Surveillance under NACP

- Basis for classification of districts
- Monitoring trend of HIV in different age groups
- Estimation of HIV infected persons in county

117. Ans. (c) 350 *[Ref. Park 23/e p351]*

118. Ans. (d) Kit 4 – Red *[Ref. Park 23/e p438]*

119. Ans. (b) Yellow *[Ref. Park 23/e p438]*

120. Ans. (d) CD4 cells less than or equal to 350 cells/mm3 *[Ref. Park 23/e p351]*

121. Ans. (b) 30 November 2006 *[Ref. Park 23/e p436]*

Review Questions

122. Ans. (a) Single dose of Nevirapine mother and child *[Ref. Park 23/e p434]*

123. Ans. (d) 1097 *[Ref. GOI, NACo website; Park 21/e p401, Park 22/e p405]*

124. Ans. (b) Tetracycline *[Ref. Park 23/e p296]*

125. Ans. (a) 200 mg *[Ref. NACO Manual for management of HIV/AIDS in children p106, Park's 23/e p434]*

126. Ans. (a) 55 *[Ref. Park 23/e p433]*

NATIONAL VECTOR BORNE DISEASES CONTROL PROGRAMME

127. Ans. (b) Insecticidal spray with rounds of HCH every 6 weeks *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p291, Park 23/e p417]*

- *Modified Plan of Operation (MPO):* In 1977, attempts at malaria eradication were given up and under review policy MPO was launched
- *Under MPO, areas were divided on the basis of API*
  - *Areas with API > 2:*
    1. Regular insecticide spray (interval 6 weeks)

Condition	Insecticide	Dose and frequency
Non-refractory to DDT	DDT	1.0 gm per square metre; 2 rounds
Refractory to DDT	Malathion	2.0 gm per square metre; 3 rounds
Refractory to Malathion	Pyrethroids	0.25 gm per square metre;2 rounds

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2. Entomological studies
3. Malaria surveillance
4. Treatment of cases
5. Intensify efforts in rural areas (providing input under Plasmodium falciparum Containment Programme with SIDA)
6. Decentralization of lab services to PHC level
7. Establishment of Drug Distribution Centers (DDCs) and Fever Treatment Depots (FTDs)

– *Areas with API < 2:*
1. Focal spray of DDT (or BHC or Malathion) if a case of Pf occurs in the area
2. Active and passive surveillance
3. Presumptive treatment to all suspected fever cases
4. Ensuring radical treatment to those found positive on blood smear
5. Epidemiological investigation of case to determine causative factors.

128. Ans. None *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p287K. Park 23/e p257]*

- In India, Plasmodium Falciparum is the commonest (51%), followed by P. vivax, P. malariae is rarely found and P. ovale has recently been reported in India
  - Recent trends have shown that P. falciparum is becoming most common cause of Malaria in India
- P. vivax is the most widely distributed and the most common species observed in temperate regions of the world, while P. falciparum is the most widespread throughout the world's tropics
- The occurrence of P. ovale has not been very common in India and till date only 4 reports of P. ovale are available from Kolkata, Orissa, Delhi and more recently from Gujarat
- Malaria is the commonest vector borne parasitic disease of the globe
- Malaria prevention and control is a component of 'National Vector Borne Diseases Control Programme' (NVBDCP); NVBDCP covers 6 vector borne diseases of public health importance in India:

Disease	Main vector
Malaria	Female Anopheles
Filariasis	Culex quinquefasciatus (C. fatigans)
Dengue	Aedes aegypti
Kala Azar	Sandfly (Phlebotamus)
Japanese Encephalitis	Culex tritaeniorhynchus
Chikungunya fever	Aedes aegypti

129. Ans. (b) Histidine-rich protein *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p289]*

- 'Dipstick Test' is used for the rapid diagnosis of Plasmodium falciparum (Pf)
  - Is a 'rapid whole blood immuno-chromatographic test'
  - Uses 2 antibodies specific for 'Pf Histidine Rich Protein II Antigen'
  - Is a 'antigen capture assay'

Also Remember

- *Optimal test (Parasite-specific lactic dehydrogenase (LDH dipstick test)):* Positive in P.falciparum and P.vivax parasitaemia; It is a simple and rapid, and superior to HRP II.
- *K-39 Dipstick test:* Is for Visceral Leishmaniasis (Kala Azar).

130. Ans. (d) Area has been reporting malaria deaths *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p293 & K. Park 19/e p348, 20/e p361]*

ENHANCED MALARIA CONTROL PROJECT (EMCP):

- World Bank supported project for six crore tribal population in 8 states
- Has been implemented in 1045 PHCs in 100 districts of 8 states
- *Selection criteria for PHCs in EMCP:*
  - Annual parasitic incidence (API) > 2 in last 3 yrs
  - Pf cases >30% of all malaria cases

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- 25% of population is tribal
- Area has been reporting deaths due to malaria (and has flexibility to direct resources to needy areas in case of outbreak).

131. Ans. (a) Deltamethrin and Cyfluthrin *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p311]*

- *Chemicals used in ITBN Programme:* Synthetic pyretheroids
  - Deltamethrin: 2.5% in dosage of 25 mg/m_2
  - Cyfluthrin: 5% in dosage of 50 mg/m_2
  - Other insecticides used: Permethrin, Lambdacyhalothrin, Etofenprox, a-cypermethrin
- *Effectiveness of pyrethroids:* for 6 – 12 months (Retreatment every 6 months)
- *Long-lasting insecticidal mosquito nets (LLINs):* Also use pyrethroid insecticides, and a chemical binder that allows the nets to be washed > 20 times, allowing use for > 3 years.

Also Remember

- *Household bed nets used for mosquito control:*
  - No. of holes per square inch > 150
  - Diameter of each hole < 0.0475 inch

132. Ans. (a) DDT *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p326; Park 21/e p281, Park 22/e p280]*

- Insecticide of choice: DDT
  - 2 rounds of spray per year
  - Spray up to 6 feet height on walls
  - If DDT–resistant, use BHC.

Also Remember

- *Sandfly is the vector of:*
  - Visceral Leishmaniasis (Kala azar)
  - Cutaneous Leishmaniasis (Oriental Sore)
  - Sandfly Fever
  - Oroya Fever
- Sandflies inject the infective stage, metacyclic promastigotes, during blood meals.
- *DDT (Dichloro-Diphenyl-Trichloroethane):*
  - *Synthesized by:* Othmar Zeidler (1874)
  - *Insecticidal properties discovered by:* Swiss scientist Paul H. Müller (1939) (awarded the 1948 Nobel Prize in Physiology and Medicine)
  - *Positive association found with:* Liver, biliary tract and breast cancers.

133. Ans. (b) API *[Ref. Park 23/e p417]*

134. Ans. (b) Annual Blood Examination Rate (ABER) *[Ref. Park 23/e p261]*

135. Ans. (b) Annual blood examination rate *[Ref. Park 23/e p261]*

136. Ans. (b) R2 type *[Ref. Medical Entomology- A textbook on Public health and Veterinary Problems by Eldridge & Edman, 1/e p213]*

Types of Drug Resistance in Malaria

- R1 resistance: Recrudescence of infection between 7-28 days of treatment completion following initial resolution of symptoms and parasite clearance.
- R2 resistance: Patients with marked reduction of parasitemia (parasite count reduced by more than 75%) at 48 h but failed to clear parasites by day 7.

137. Ans. (c) 1 *[Ref. K. Park 23/e p261]*

138. Ans. (c) Developing newer insecticides *[Ref. Roll Back Malaria Website]*

139. Ans. NONE [IT INCLUDES ALL] *[Ref. K. Park 23/e p418]*

140. Ans. (c) Anti-larval measures *[Ref. K. Park 23/e p415]*

141. Ans. (b) API *[Ref. K. Park 23/e p261]*

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142. **Ans. (d) 300 mg Once/week** *[Ref. Drug Therapy in Nursing by Aschenbrenner 3/e p919]*

143. **Ans. (b) Cover overhead tanks properly** *[Ref. Guidelines for Source Reduction, NVBDCP, Government of India]*
- In urban areas, Malaria is mainly transmitted by Anopheles stephensi
  - Breeds in man-made water containers in domestic/ peridomestic situations such as tanks, wells, cisterns, which are of permanent nature and hence can malaria transmission throughout the year
- Recommended measures for Urban Malaria control:
  - Lids of overhead tanks must be checked and maintained monthly basis; any leakage be repaired immediately (most effective)
  - Cover-up of underground and open tanks
  - Open tanks used for animals be dead dried once in week
  - Never to throw any containers in open capable of holding water
  - Construction sites: Building bye-laws be implemented to prevent fault in designs, water flow on roof, gully traps open tanks for curing be treated with larvicides on weekly basis
  - Unused wells either be closed or treated with larvicides
  - Ornamental tanks, fountains be checked periodically and larvivorous fish be introduced
  - Public health engineers be involved for proper drainage, building designs, periodic flushing of water logged areas and drainage

144. **Ans. (c) Quinine** *[Ref. Park 23/e p263]*

145. **Ans. Ans. (d) 10 days** *[Ref. New Scientist, Volume 97 p733]*
- 10 days is the minimum time required for reproductive cycle of parasite within the vector

146. **Ans. (a) ACT only** *[Ref. Park 23/e p265]*

147. **Ans. (d) Increase in the number Plasmodium species** *[Ref. Short Textbook of PSM by Prabhakara, 1/e p147]*
- There was a Malaria resurgence in India in Early 1970's due to:
  - Operational failure
  - Administrative failure
  - Technical failure: Insecticidal resistance, Drug resistance, population movements

148. **Ans. (d) Primaquine contraindicated in infants and pregnant women** *[Ref. Park 23/e p263]*
- Presumptive treatment is not used in NVBDCP (Malaria) currently
- ACT is the DOC in P. falciparum and P. malariae
- Primaquine is given in all cases of malaria
- Primaquine contraindicated in infants and pregnant women

Review Questions

149. **Ans. (a) Chloroquine** *[Ref. Park 23/e p262]*

150. **Ans. (a) Fortnightly** *[Ref. Park 23/e p417]*

151. **Ans. (d) Annual parasite index** *[Ref. Park 23/e p417]*

152. **Ans. (c) 600 (New Guidelines: No Presumptive treatment)** *[Ref. Park PSM 20/e p228, 229]*

NRHM

153. **Ans. (c) ASHA is skilled birth attendant** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p85-86, Park 21/e p407, Park 23/e p449]*

154. **Ans. (c) Accredited Social Health Activist** *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p69, 79, 80 Park 21/e p405, Park 23/e p449]*
- *National Rural Health Mission (NRHM) 2005–12:* One of the key components of the is to provide every village in the country with a trained female community health activist – ASHA (Accredited Social Health Activist)
- *Proposed population norm:* 2 ASHA worker per 1000 population (Village Level)
- *ASHA is expected to act as,*
  - *Interface between:* Community and Health care system
  - *Bridge between:* ANM and village
  - *Accountable to:* Panchayat

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- *Selection criteria of ASHA:*
  - Woman resident of local community
  - Preferably 25 – 45 years age
  - Literate with formal education up to VIII class

155. Ans. (d) Village Level *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p85; Park 23/e p449]*

- A core strategy of National Rural Health Mission (NRHM) is to develop 'Health Plan (VHP) for each village' through Village Health Samiti of Panchayat (PHS)
  - ASHA will make VHP: ASHA along with ANM, Aanganwadi Workers and community workers under the leadership of PHS.
- Another core strategy is preparation of an 'Intersectoral District Health Plan (DHP)', prepared by District Health Mission (DHM) including drinking water, sanitation, hygiene and nutrition.
  - DHP: Amalgamation of field responses through VHPs and State and national Priorities for health, drinking water, sanitation and nutrition.
  - Health plans to form core unit of action proposed.
  - Implementing departments to integrate into DHM for monitoring.
  - Core unit of planning, budgeting and implementation: District.

156. Ans. (c) Reduction in infant mortality *[Ref. Park 21/e p408, Park 22/e p414]*

Impact Indicators for Monitoring and Evaluation of ASHA's Work:

- Infant mortality rate (IMR)
- Child malnutrition rates
- No. of cases of TB/Leprosy detected as compared to last year

157. Ans. (b) Formation of family health and social welfare societies *[NRHM – Mission Document, Ministry of Health and Family Welfare, Government of India. 2005; Park 21/e p405-08, Park 22/e p409-14]*

158. Ans. (a) Janani Suraksha Yojana *[Ref. K. Park 23/e p455]*

Janani Suraksha Yojana (JSY)

- Launched on 12th April 2005
- Is 'modification of National Maternity Benefit Scheme
- *Objectives of JSY:* Reduction of maternal mortality and infant mortality (through institutional deliveries and care especially for poor women)
- *Salient features of JSY:*
  - Is 100% centrally sponsored
  - Combines 'benefit of cash assistance with institutional care'.

159. Ans. (c) ANM and Anganwadi worker *[Ref. K. Park 23/e p450]*

- *Resource person for training of ASHA:* ANM and Anganwadi worker.

160. Ans. (a) NRHM *[Ref. K. Park, 23/e p449]*

161. Ans. (b) Institutional deliveries *[Ref. K. Park, 23/e p455]*

162. Ans. (a) Accredited Social Health Activist *[Ref. K. Park, 23/e p449]*

163. Ans. (a) 2005 *[Ref. K. Park, 23/e p448]*

164. Ans. (b) Zero dose of OPV and BCG *[Ref. Operational Guidelines for ASHA, NHRSC]*

ASHA payments under JSY: ON 45th DAY	*Other ASHA payments:*
• 6 visits in Institutional deliveries (Day 3,7,14,21,28,42)	• Institutional deliveries
• 7 visits in home deliveries (Day 1,3,7,14,21,28,42)	• Arrange transport of AN mother
• Birth weight record	• Escort AN mother to facility
• Immunized with BCG, First dose of OPV & DPT	• Completed immunization upto 1 & 2 yrs age
• Birth registration	• Pulse Polio immunization
• Mother and child are safe	• Family planning services
	• Sanitary napkins to adolescent girls
	• Promote use of sanitary toilets

Contd...

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Contd...

	• DOTS provider • Leprosy treatment • P/S for Malaria • Malaria treatment

165. Ans. (d) Free treatment of sick infants up to 1 year *[Ref. Park 23/e p451]*

PREGNANT WOMEN COMPONENTS IN JANANI-SHISHU SURAKSHA KARYAKRAM (JSSK)
- Free deliveries (including caesarean section) in public health institutions
- Free drugs and consumables
- Free diet (Normal delivery: 3 days; Caesarean section: 7 days)
- Free diagnostics
- Free blood transfusion (whenever required)
- Free transport from home to institution

166. Ans. None (2 ASHAS per 1000 population) *[Ref. Park 23/e p449]*

167. Ans. (d) Village *[Ref. Park 23/e p449]*

168. Ans. None (All are features of JSY) *[Ref. Park 23/e p455]*
- ASHA is designated Link worker between pregnant woman and Health care institution (Government) in JSY
- Cash assistance is given to mothers for high and low performing states: Only for BPL family women, aged 19 years and above, upto first two live births

Review Questions

169. Ans. (c) ASHA. *[Ref. Indian Pediatrics Vol. 42, No. 8, aug 2005, p 783, Park 21/e p407, Park 23/e p449]*

170. Ans. (c) 1 per 1000 population; (d) Female untrained guide. *[Ref. Park 23/e p449]*

NATIONAL LEPROSY ELIMINATION PROGRAMME

171. Ans. (a) Rifampicin + dapsone *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p361, Park 23/e p323]*
- *Treatment of Single Skin Lesion (SSL) of Leprosy:*
  - Previously: ROM therapy
    1. Rifampicin 600 mg
    2. Ofloxacin 400 mg
    3. Minocycline 100 mg
  - CURRENTLY: 6 month treatment as for Paucibacillary (PBL) Leprosy (Rifampicin and dapsone for 6 months)

Also Remember
- *Level of Leprosy for declaring it as a Public Health Problem:* >1/10,000
- *Elimination Level of Leprosy:* <1/10,000
- *Goal for Leprosy under National Health Policy (NHP) 2002:* Elimination of Leprosy by 2005
- India eliminated Leprosy in December 2005 (India has so far eliminated 4 diseases, namely, Guineaworm – 2000, Leprosy – 2005, Yaws – 2006 and NNT – 2015).

172. Ans. (b) Leprosy *[Ref. National Helth programmes of India by Dr. J kishore, 8/e p356; Park 23/e p322]*

173. Ans. (a) Stop anti-leprosy drugs *[Ref. Park 23/e p324]*
- *Lepra Reactions:* Is an inflammation that can affect skin patches, nerves, eyes and in few case, internal organs They can occur anytime in a leprosy patient
  - Before diagnosis
  - At time of diagnosis
  - During treatment
  - After treatment has finished
- There is no need to stop antiperosy drugs during MDT.

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174. Ans. (a) 20-25000 *[Ref. National Health Programmes of India by Dr. J. Kishore, 2/e p50]*

- *Survey Education and Treatment (SET) Centre:*
  - A SET Centre is attached with: PHC in rural area
  - Administrative control: Medical Officer (PHC)
  - Population catered: 20 – 25, 000.

Also Remember

- *Infrastructure norms under programme:*
  - *SET Centre:* one per 20,000 – 25,000 population
  - *Urban Leprosy Centre (ULC):* one per 50,000 population
  - *Leprosy Control Unit (LCU):* one per 4.5 Lac population
- *SAPEL and LEC:*
  - Special Action Projects for Elimination of Leprosy (SAPEL) in Rural areas and Leprosy Elimination Campaigns (LEC) for Urban areas: To cover populations residing in difficult/inaccessible areas, which were not generally covered by regular programme activities.

175. Ans. (c) Any responsible person from family or village can collect MDT, if patient is unable to come *[Ref. Guide to eliminate Leprosy as a Public Health Problem, WHO & NLEP; p25]*

- *Accompanied MDT:* If patient is unable to come to collect his/her MDT from clinic, any responsible person from family or village can collect it
  - Designed to help patients who have to interrupt their treatment due to any avoidable reason
  - Especially useful for irregular patients
  - Gives patients a choice: Patients can collect entire MDT course when diagnosed after proper counseling.

176. Ans. (a) 12 months *[Ref. Park 23/e p324]*

177. Ans. (c) 5 years *[Ref. K. Park, 23/e p326]*

178. Ans. (b) Dapsone, Rifampicin *[Ref. K. Park, 23/e p323]*

179. Ans. (d) 1983 *[Ref. K. Park, 23/e p422]*

180. Ans. (c) Post-treatment surveillance of paucibacillary leprosy *[Ref. K. Park, 23/e p324]*

181. Ans. (d) Minocycline *[Ref. Park 22/e p296-97]*

182. Ans. (b) 9 months *[Ref. Park 23/e p322]*

- *Adequate treatment*: Patient has received 6 months of therapy in 9 months (for PBL) or 12 months of therapy within 18 months (for MBL) Q
- *Regular treatment*: Received MDT for two-thirds of total duration of therapy, i.e. 4 months for PBL (out of 6 months of duration of therapy) and 8 months for MBL (out of 12 months of duration of therapy)

OTHER PROGRAMMES

183. Ans. (a) To reduce disease burden by 25% by end of XI Five Year Plan *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p490]*

- *National Programme for Prevention and Control of Deafness:*
  - Long term objective: To reduce disease burden by 25% by end of XI Five Year Plan.

184. Ans. (b) Urinary iodine levels among pregnant women *[Ref. WHO-UNICEF-ICCIDD. Assessment of Iodine Deficiency Disorders and Monitoring their Elimination – A guide for programme managers, 2/e p5]*

Indicators to Monitor Success of IDD Control Programme:

- *Impact Indicators:* Indicators to assess baseline (Iodine Deficiency Disorders) IDD status and to monitor and evaluate the impact of salt iodization on the target population
  - *Urinary Iodine Levels:* The 'principal impact indicator' recommended once a salt iodization programme has been initiated (changes in goitre prevalence lag behind changes in iodine status and therefore cannot be relied upon to reflect accurately current iodine intake, although they may be useful in following trends)
  - *Goitre assessment:* (by palpation or by ultrasound) should remain a component of surveys to establish the baseline severity of IDD
  - *Neonatal thyroid stimulating hormone (TSH) levels:* may also play a role here if a country already has in place a screening programme for hypothyroidism.

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Also Remember

- *Criteria for tracking progress towards IDD elimination:*

Indicator	Goal
Proportion with enlarged thyroid (age 6 – 12 years)	< 5%
Urinary Iodine Excretion below 100 mcg/litre	< 50%
Urinary Iodine Excretion below 50 mcg/litre	< 20%
Proportion of houses consuming adequately iodised salt	> 90%

- *Some noteworthy daily requirements:*

Nutrient	Recommended daily requirement
Calcium	600 mg
Iron	17 mg (males); 21 mg (females)
Iodine	150 mg
Fluorine	0.5 – 0.8 mg/litre.

185. Ans. (b) 1 lakh IU *[Ref. Park 23/e p616]*

- *National Programme for Prophylaxis against Blindness in Children caused by Vitamin A Deficiency:* Prophylaxis against Vitamin-A deficiency is provided in form of oral 5 doses of Vitamin-A
  - 1st dose (1 lac IU) at 9 months age (along with measles vaccine)
  - 2nd dose (2 lac IU) at 15 months age
  - then a dose (2 lac IU) every 6 months till the age of 3 years
- *Vitamin A supplement administered in Prevention of Nutritional Blindness in Children Programme contain:* 1 Lac IU per ml

186. Ans. (a) ₹1 per day per day poor and individual to ₹2 per day for a family of seven *[Ref. Ministry of Finance, Press Information Bureau (PIB) Release, July 08, 2004]*

Community based Universal Health Insurance Scheme (UHIS):

- *Launched in India:* in 2003–04 for BPL (Below Poverty Line) population
- *Age limit:* 3 months – 65 years
- *Premium Payable (Post Subsidy):*
  - For an individual: ₹165/-per annum
  - For a family up to 5 members: ₹248/- per annum
  - For a family up to 7 members: ₹330/- per annum.

187. Ans. (b) 100 mg of elemental iron and 500 micrograms of folic acid *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p413K. Park 23/e p642]*

Refer to Ans. 51.

- *Recommendations by Government of India (2007):*
  - Include infants 6 – 12 months age in the programme
  - For 6 – 60 months age, provide liquid formulations
  - Recommended daily intakes:

Group	Recommended daily intake	
	Elemental iron	Folic acid
Children 6–60 months	20 mg per day	100 mcg per day
Children 6–10 years	30 mg per day	250 mcg per day
Adolescents 11–19 years	100 mg per day	500 mcg per day
Adults	100 mg per day	500 mcg per day

188. Ans. (b) 1 lakh IU/ml *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p202; Park 23/e p616]*

- Vitamin A solution contains 1 lac IU per ml solution
- Vitamin A is given in NIS of India till 5 years age (Recent guidelines)
  - At 9 months age: 1 lac IU (1 ml)
  - Every 6 months, till 5 years age: 2 lac IU (2 ml) each
  - Total dose given: 17 lac IU (9 doses).

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189. Ans. (b) Filaria *[Ref. Park 23/e p273]*

190. Ans. (a) 15 ppm *[Ref. Assessment of IDD and monitoring their elimination, WHO, 3/e Park 23/e p643]*

- *Criteria for Sustainable Elimination of IDD:*
  - Median Urinary Iodine Excretion 100 mcg/l
  - Level of iodization:
    1. 30 ppm at production level
    2. 15 ppm at consumer level
  - Total Goitre Rate (TGR) < 5%

191. Ans. (b) Increasing no. of children affected *[Ref. Park 23/e p321]*

INDICATORS IN LEPROSY CONTROL

Case detection indicators

- % of children (0-14 yrs) among new detected cases: A high prevalence of infection among children indicate that Leprosy is a active and spreading
- % of females among new detected cases
- % of Multi-bacillary cases on regular treatment
- % of new cases with grade 2 disability.

192. Ans. (a) Surveillance of risk factors of non-communicable disease *[Ref. World Health Organisation]*

- *STEPwise approach to surveillance (STEPS):* Is a simple, standardized method by WHO for surveillance
  - Is of two types:
  - STEPwise approach to chronic disease risk factor surveillance
  - STEPwise approach to Stroke surveillance
- *Comprises of 3 steps:*

STEPS	Core	Expanded
STEP 1: Behavioural measurements	Tobacco use	Tobacco use
	Alcohol consumption	Alcohol consumption
	Diet	Diet Physical activity
	Physical activity	History of raised BP
	History of raised BP	History of diabetes
	History of diabetes	
STEP 2: Physical measurements	Height & weight	Hip circumference
	Waist & BP	Heart Rate
STEP 3: Biochemical measurements	Blood glucose	Triglycerides &
	Blood lipids	HDL cholesterol

193. Ans. (d) Is a type of employment scheme *[Ref. RSBY Document, Government of India]*

Rashtriya Swasthya Bima Yojana

- **Synonym:** National Health Insurance Scheme (NHIS)
- **Beneficiaries:** Below poverty line families
- **Contribution:**
  - Central government: INR 600/- (75% of total)
  - State Government: INR 200 (25% of total)
  - BPL family: INR 30/- (One time payment)
- **Benefits:**
  - Inpatient medical cover per family per year: INR 30,000/-
  - Cover in case of death of family member: INR 25,000/-

194. Ans. (c) Government run insurance scheme for poor *[Ref. RSBY Document, Government of India]*

195. Ans. (a) Applies to BPL families only *[Ref. RSBY Document, Government of India]*

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196. **Ans. (a) 1982** *[Ref. K. Park 23/e p473]*

197. **Ans. (a) Snake bite** *[Ref. K Park 23/e p474-475]*

Diseases covered under IDSP (P-FORM)

- Acute Diarrhoea Disease (including acute gastroenteritis, Cholera)
- Bacillary Dysentery
- Viral Hepatitis
- Enteric Fever
- Malaria
- Dengue/DHF/DSS
- Chikungunya
- Acute Encephalitis Syndrome
- Meningitis
- Measles
- Diphtheria
- Pertussis
- Chicken Pox
- Fever of Unknow Origin (PUO)
- Acute Respiratory Infection (ARI) Influenza Like lllness (ILI)
- Pneumonia
- Leptospirosis
- Acute Flaccid Paralysis < 15 year of Age
- Anthrax
- Plague
- Any other State Specific Disease
- Unusual Syndromes NOT Captured Above

198. **Ans. (c) Herpes zoster** *[Ref. K Park 23/e p474-475]*

Diseases Covered Under Idsp

Regular surveillance:	*Sentinel surveillance:*
• Malaria	HIV, HBV, HCV
• Cholera, Typhoid	Water quality
• Tuberculosis	Air quality (outdoor)
• Measles	***Regular periodic surveys:***
• Poliomyelitis	Anthropometry
• Road traffic accidents	Physical activity
• Plague	Blood pressure
• **Unusual disease syndromes:** Meningoencephalitis, Hemorrhagic fevers, Respiratory distress	Tobacco Nutrition
	Additional state priorities:

199. **Ans. (c) District hospital has specialised facilities** *[Ref. K Park 23/e p471-473]*

200. **Ans. (d) CHC has facilities for diagnosis and treatment of CVD, Diabetes** *[Ref. K. Park 23/e p471-473]*

201. **Ans. (c) Periodic regular survey** *[Ref. K. Park 23/e p474-475]*

202. **Ans. (d) Median urinary iodine excretion**
[WHO-UNICEF-ICCIDD, Assessment of Iodine Deficiency Disorders and Monitoring their Elimination – A guide for programme managers, 2/e p5]

203. **Ans. (d) Integration with National Cancer Control Programme** *[Ref. Park 23/e p471-473]*

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204. Ans. (b) Presumptive *[Ref. Park 23/e p474]*

TYPES OF SURVEILLANCE IN IDSP

- *Syndromic*: Diagnosis made on the basis of clinical pattern by paramedical personnel and members of the community
  - Fever
  - Cough more than three weeks duration
  - Acute Flaccid Paralysis
  - Diarrhoea
  - Jaundice
  - Unusual events causing death or hospitalization
- *Presumptive*: Diagnosis made on typical history and clinical examination by Medical Officers
  - Validity of presumptive diagnosis will be higher than Syndromic
- *Confirmed*: Clinical diagnosis confirmed by an appropriate laboratory test

205. Ans. (c) Confirmed diagnosis *[Ref. IDSP Document, NRHM, Government of India, p1]*

REPORTING FORMATS UNDER IDSP

- "S" (suspected cases) form: Data generated by Health Workers
- "P" (presumptive cases) form: Data generated by Clinician
- "L" (Laboratory confirmed cases) form: Data generated by Clinical Laboratory staff

206. Ans. (c) Human rights of mentally ill *[Ref. NMHP 1987, MOHFW, GOI]*

- GOI launched National Mental Health Programme (NMHP) in 1982, with objectives:
  - To ensure the availability and accessibility of minimum mental healthcare for all in the foreseeable future, particularly to the most vulnerable and underprivileged sections of the population
  - To encourage the application of mental health knowledge in general healthcare and in social development; and
  - To promote community participation in the mental health service development and to stimulate efforts towards self-help in the community.

207. Ans. (c) State Government maintain and manage all water supply *[Ref. Park 23/e p476]*

SWAJALDHARA PROGRAMME

- *Launched*: 25 December 2002
- *Current status*: Renamed as National Rural Drinking Water Programme (2009), a component of Bharat Nirman
- *Description:* Community led, participatory programme with aim of providing drinking water in rural areas though community participation
  - *Swajaldhara I (First dhara)*: Gram panchayat/ Group of panchayats (Block/Tehsil level)
  - *Swajaldhara II (Second dhara)*: District level
- *Key features/components*:
  - *Government*: planning, policy, monitoring, evaluation
  - *Panchayat/Village water & Sanitation committee*: Plan, implement, operate, maintain, manage project
  - *Integrated service delivery mechanisms*: Water conservation (rain water harvesting, Ground water recharge

208. Ans. (d) National Programme for prevention and control of Cancer, Diabetes, Cardiovascular diseases and Stroke *[Ref. Park 23/e p471]*

Review Question

209. Ans. (a) 1/3 1/2 *[Ref. Park 23/e p661]*

210. Ans. (a) 6 month *[Ref. Park 23/e p324]*

211. Ans. (c) 10,000 *[Ref. Park 23/e p423]*

212. Ans. (c) Rifampicin + Dapsone + Clofazamine *[Ref. Harrison, Principles of Internal Medicine, 16/e p951, 971; Park 23/e p323]*

213. Ans. (d) 10 *[Ref. Park 23/e p322]*

214. Ans. (b) Clofazimine, Rifampicin and dapsone *[Ref. Park 23/e p323]*

215. Ans. (b) Is a substitute for regular food *[Ref. Park 23/e p661]*

216. Ans. (c) 15 ppm *[Ref. Park 23/e p643]*

217. Ans. (c) 2,00,000 IU *[Ref. Park 23/e p641]*

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MISCELLANEOUS (H. PROGRAMMES)

218. Ans. (d) Wayson's staining *[Ref. Dr J. Kishore 8/e p258; Park 23/e p295]*

- **In the given question,** a young boy had a flea bite while working in a wheat grain godown and after 5 days he developed fever and had axillary lymphadenopathy
- Thus most likely it is Plague which is transmitted by Rat flea (Xenopsylla cheopsis)
- So the stain used will be Wayson's staining, which will show 'Bipolar appearance' or 'Safety pin appearance' of Yersinia pestis
- *Stains commonly used in Public Health:*

Disease (organism)	Stain(s) used
TB (Mycobacterium tuberculosis)	Zeihl Neelson (ZN) stain (RNTCP)
	Auramine Rhodamine stain
Leprosy (Mycobacterium leprae)	Modifed Zeihl Neelson (Modified ZN) stain
Malaria (Plasmodium)	Jaswant Singh Bhattacharya (JSB) stain
Plague (Yersinia pestis)	Wayson's stain
	Giemsa stain
Diphtheria (Corynebacterium diphtheriae)	Albert's stain
	Neisser's stain
	Ponder's stain

219. Ans. (b) National Leprosy Eradication Programme *[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p311, 8/e p366-67]*

- *Simplified Information System:* Is the Management and Information System (MIS) essential for the monitoring and evaluation of National Leprosy Eradication Programme (NLEP); It was started in 2002.

220. Ans. (b) Dapsone *[Ref. National Health programmes of India by Dr. J. Kishore, 8/e p203 and Park 23/e p323]*

221. Ans. (a) Malaria; (b) Filaria; (c) Leprosy *[Ref. K. Park 23/e p416, 421-422]*

222. Ans. (b) Adolescent girls *[Ref. K. Park, 22/e P547]*

223. Ans. (a) RNTCP *[Ref. K. Park 23/e p427]*

224. Ans. (d) Herpes zoster *[Ref. K. Park 23/e p474]*

225. Ans. (b) Women & Child Development *[Ref. ICPS Document, GOI]*

226. Ans. (c) 1975 *[Ref. K. Park 23/e p590]*

227. Ans. (b) Rajiv Gandhi scheme (SABLA) *[Ref. Welfare Schemes for Adolescent Girls in India, Government of India]*

228. Ans. (c) Tuberculosis *[Ref. Park 23/e p429]*

NIKSHAY

- *Description*: A web enabled application, which facilitates the monitoring of universal access to TB patients' data by all stakeholders at different tiers of the Healthcare Delivery System
  - *SMS based communication*: With TB patients, Grass-root level healthcare service providers, Policy makers, Health managers/ administrators
  - *Launched by*: Central TB Division (MOHFW) & National Informatics Centre (NIC) on 4th June 2012
- *Broad Objectives*: For the eradication of TB effectively in India,
  - To create a database of all TB patients including MDR cases across the country
  - Use this database for monitoring and for research purposes at all levels

229. Ans. (b) NACP *[Ref. Park 23/e p437]*

LINK WORKER SCHEME

- *Programme*: National AIDS Control Programme III
- *Main objective*: To address populations with highrisk behaviours (including High Risk

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- Groups and Bridge Populations) with the premise that there are significant numbers in Rural areas and to reach out to them in order to saturate the coverage of these groups
- *Link Worker*: Someone who is not "alien" to the neighbourhood, is accepted by the village community, and who can discuss intimate human relations and practices of sex and sexuality and help equip highrisk individuals and vulnerable young people with information and skills to combat the pandemic
- *Population norm*: One link worker per 5000+ village population

Also Remember

- Link workers have also been part of Enhanced Malaria Control Project
- ASHA worker is also called as Link worker

Review Questions

230. Ans. (a) To attain the goal of health *[Ref. Park 17/e p651; 18/e p687; 20/e p793; 21/e p834]*

231. Ans. (a) Revised National Tuberculosis Control Programme; (d) National Leprosy Eradication Peogram *[Ref. Park 23/e p188, 323]*

RASHTRIYA SWASTHYA BIMA YOJANA

232. Ans. (d) Cashless benefit in hospitals *[Ref. RSBY Document, Government of India]*

NATIONAL HEALTH POLICY

233. Ans. (c) Filariasis *[Ref. Park 23/e p873]*

- *Goal of NHP 2002 for year 2015*-Elimate Lymphatic filariasis.

234. Ans. (a) 100 *[Ref. K. Park 23/e p873]*

Review Question

235. Ans. (a) Primary health care *[Ref. Park 23/e p873]*

NATIONAL POPULATION POLICY

236. Ans. (c) 20 years *[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p491 Park 23/e p493]*

237. Ans. (c) Divorces *[Ref. National Health Programmes of India by Dr. J. Kishore, 7/e p491 Park 23/e p493]*

- According to National Population Policy 2000 (NPP 2000), one of the national socio-demographic goals is 'to achieve 100% registration of births, deaths, marriage & pregnancy by 2010'.
- According to 'The Registration of Births and Deaths Act 1969', both the births and deaths are to be registered within 21 days each.

Time of registration	Additional Requirements
Within 21 days	None
Delay < 30 days	Prescribed fee
Delay > 30 days & < 1 year	Late fee + affidavit from notary public
Delay > 1 year	Late fee + order from Class I officer/magistrate

- Marriage registration has to be done within 30 days.

238. Ans. (b) 2010 *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p570, Park 23/e p493]*

National Population Policy 2000 (NPP 2000)

- *Immediate objective:* To address the unmet needs for contraception, health care infrastructure, and health personnel, and to provide integrated service delivery for basic reproductive and child health care.
- *Mid-term objective:* To bring the TFR to replacement levels (TFR = 2.1) by 2010.
- *Long term objective:* To achieve a stable population by 2045.

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Also Remember

- *Total Fertility Rate (TFR):* Average no. of children a woman would bear in her reproductive life span; also known as 'Period Total Fertility Rate'.
  - Gives magnitude of approximately 'completed family size' – no. of alive children in a family
  - Obtained by summing single-year age-specific rates at a given time
  - *TFR is a synthetic rate:* Is not actually counted, as this would involve waiting until women complete childbearing
  - *TFR (India):* 2.68 (NFHS – 3, 2005 – 06)
  - *Replacement level of fertility (TFR = 2.1):* TFR at which newborn girls would have an average of exactly 1 daughter over their lifetimes (women have just enough babies to replace themselves.
    1. Replacement TFR (industrialized countries) = 2.1
    2. Replacement TFR (developing countries) = 2.5 – 3.3
    3. Replacement TFR (globally) = 2.33
  - *Total cohort fertility rate (TCFR)* is a better estimate of completed family size than TFR.

239. Ans. (c) Reduction of MMR to less than 1/1000 live births *[Ref. Park 23/e p493]*

240. Ans. (d) Bring down TFR to replacement levels by 2015 *[Ref. K. Park 23/e p493]*

Review Question

241. Ans. (a) 1976 *[Ref. Park 23/e p493]*

NATIONAL MENTAL HEALTH POLICY

242. Ans. (d) 2014 *[Ref. NMHP document, Ministry of Health & Family Welfare, Government of India 2014]*

MILESTONES OF MENTAL HEALTH IN INDIA

- National Mental Health Programme (NMHP): 1982
- National Mental Health Act (NMHA): 1987
- District Mental Health Programme (Under NMHP): 1996
- National Mental Health Care Bill (NMHCB): 2013
- National Mental Health Policy (NMHP): 2014

IT ACT

243. Ans. (b) 2000 *[Ref. Gazette of India – Extraordinary, Part II; Section 1]*

- *The Information Technology Act:* was passed by the Government of India in 2000; it deals with:
  - Legal Recognition of Electronic Documents
  - Legal Recognition of Digital Signatures
  - Offenses and Contraventions
  - Justice Dispensation System for Cybercrimes.

Also Remember

Some Important Health Legislations Passed in India:

- The Employees State Insurance (ESI) Act, 1948
- The Factories Act, 1948
- The Medical Termination of Pregnancy (MTP) Act, 1971
- The Organ transplanation Act, 1994
- The Pre-conception and Pre-natal Diagnostic Techniques (Prohibition of Sex Selection) (PNDT) Act, 1994
- Information Technology Act, 2000
- The National Rural Employment Guarantee Act (NREGA), 2005
- The Right to Information (RTI) Act, 2005.

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OT ACT

244. Ans. (d) 1994 *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p675]*

- The Transplantation of Human Organs Act was passed by Government of India in 1994; It is an act to provide for the regulation of removal, storage and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs and for matters connected therewith or incidental thereto.

245. Ans. (d) More than 5 years *[Ref. National Health Programmes of India by Dr. J. Kishore, 9/e p696]*

- *Punishments under Organ Transplantation Act 1994:*
  - For medical practitioners involved: Removal of name for 2 years from Medical register (and permanent removal for any subsequent offence)
  - For other persons involved: Five years imprisonment + Fine up to ₹ 10,000/-
- *New Modification in 2011:* Punishment for persons involved to be increased to up to 10 years imprisonment + fine up to ₹ 20,00,000-1,00,00,000/-.

CBD REGISTRATION ACT

246. Ans. (d) 21 days & 21 days *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p664]*

247. Ans. (c) 1970 *[Ref. Park 23/e p840]*

- Central Birth and Death Registration Act 1969 came into force on: 1st April 1970

OTHER LEGISLATIONS

248. Ans. (c) 2005 *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p712]*

National Rural Employment Guarantee Act (NREGA) 2005:

- The NREGA Act 2005 has been passed by the Parliament to provide for '100 days of guaranteed wage employment in every year' to every household whose adult members volunteer to do 'unskilled manual work'; Salient features:
  - A household is entitled for '100 days of work in a year' (Minimum `130/- per day).

249. Ans. (b) Smoking *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p654]*

- The Indian Medical Council Act, 1956; (Professional Conduct and Ethics) & Regulations, 2002: May remove name of physician or publicize his/her name in press on violation of code of conduct and ethics.

250. Ans. (a) 00.00 hrs 01 March *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p662]*

- *Census Stop (India) :* 01 March 00.00 Hours (First year of each decade) (Ist time and date on which population count is done).

Also Remember

- *National Family Health Survey (NFHS):* NFHS is a 5 yearly activity. It has successfully completed three rounds
  - NFHS – I: 1992–93
  - NFHS – II: 1998–99
  - NFHS – III: 2005–06
- *Some key dates:*
  - Census Stop (Census Movement): 01 March
  - Mid year Population: 01 July

251. Ans. (c) Workman's compensation act *[Ref. K. Park 20/e p613]*

- Workman's compensation act 1923
- MTP Act 1971
- Indian factories act 1948
- ESI Act 1948

252. Ans. (c) When acceptors requires incentives *[Ref. Park 23/e p506]*

253. Ans. (a) ESI; (b) Factory; (d) Children Act; (e) MTP *[Ref. National Health Programmes by Dr J. Kishore, 8/e p686, 717, 720, 748; Park 23/e p506, 815, 816]*

- ESI Act: 1948
- The Factory Act: 1948

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- Children's Act: 1960
- The MTP Act: 1971
- Air Protection Act: 1981

254. Ans. (a) Drugs Controller General of India *[Ref. National Health Programmes of India by Dr. J. Kishore, 8/e p587; Park 21/e p442, Park 22/e p440]*

Also Remember

- *Unlicensed blood banks phased from India:* May 1997
- *Professional blood donation banned in:* December 1997
- *National blood policy was evolved in:* 2002
- *Mandatory testing of blood is done for 5 diseases.*
  - HIV
  - Syphilis
  - Malaria
  - Hepatitis B
  - Hepatitis C

255. (a) Drug users sent to treatment not jail if requested *[Ref. National Health Programmes of India by Dr. J. Kishore, 9/e p 690-692]*

The Narcotic Drugs and Psychotropic Substances Act, 1985

- Whosoever produce, manufacture, buy, sell, produce, transport, use, consume any narcotic drug (Opium/poppy) or psychotropic substance: Shall be punished with imprisonment 10-20 years + fine 1-2 lac rupees (5 years + 50000 rupees for Ganja).
  - Users, if not covered under Sections 15-25, will be sent for treatment/ rehabilitation and not punished
- Breach in licence for opium growth: Shall be punished with imprisonment 3 years with or without fine
- Whosoever possess a small quantity for personal consumption: Shall be punished with imprisonment 6 months + fine
- Subsequent offences: Death penalty
- Alcohol use: IS NOT covered by this act.

Also Remember

ESSENTIAL MEDICINES

- **Essential medicines:** Those which satisfy the priority health care needs of the population (Mnemonic: 6A's)
  - Available
  - Adequate amounts
  - Appropriate dosage forms
  - Assured quality
  - Adequate information
  - Affordable (at a cost community/country can afford)

WHO MODEL LIST OF ESSENTIAL MEDICINES

- *WHO Model List:*
  - First drawn up in 1977
  - Revised and updated at an interval of 2 years
  - Latest list: 15th March 2007
  - Not designed as a global standard; but many organisations have modelled their medicine supply system on this list
- *Selection criteria:*
  - Public health relevance
  - Evidence of efficacy and safety
  - Comparative cost effectiveness
- *Core list:* List of minimum medicine needs for a basic health care system, listing most safe, efficacious and cost-effectiveness medicines of priority conditions
- *Complementary list:* Essential medicines for priority diseases, for which specialised diagnostic or care facilities are needed

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- *Key notable points:*
  - Brackets: To mention the strength of selected salt or ester
  - When it refers to active moiety, the name of salt or ester in brackets is preceded by "as"
  - Oral liquids: To mention suspension, solution or any other liquid
  - Tablets: Allow forms of immediate-release tablets
  - Enteric coated: Modified release dosage
  - Square box symbol (%): Indicate similar clinical performance within a pharmacological class
- *Dosage forms:* listed in alphabetical order.

COUNTERFEIT MEDICINES:

- WHO definition: A drug/medication which is produced with intention to cheat
  - Mislabelling (including fudging expiry date)
  - No active ingredients
  - Wrong ingredient
  - Right ingredient in insufficient quantity
- **Types of counterfeit medicines:**
  - In developed countries: New expensive lifestyle medicines (hormones, steroids, antihistamines)
  - In developing countries: Medications to treat life threatening conditions (HIV/AIDS, TB, Malaria)
- Global burden: More than 10% of global medicines
  - 25% of medicines in developing countries

QUALITY CONTROL IN DRUG SECTOR IN INDIA

- *Quality control of drugs in India:*
  - Drugs and Cosmetics Act 1940
  - Drugs and Cosmetics Rules 1945
- *Central Drugs Standard Control Organisation (CDSCO):*
  - Headed by:
    1. Central level: Drugs Controller General, India (DGHS, MOHFW)
    2. State level: State Drugs Controllers
  - Main functions:
    1. Quality control of imported drugs
    2. Coordination of activities under State Drugs Control Authorities
    3. Approval for importation/manufacture of new drugs
    4. Laying standards for and act as 'Central Licensing Authority for blood and blood products, iv fluids, sera, vaccines, r-DNA products'
- *Zonal offices:* Mumbai, Kolkata, Ghaziabad, Chennai.

256. Ans. (c) 20 weeks *[Ref. K. Park 23/e p506]*

257. Ans. (b) 1987 *[Ref. Reconstructing Mental Health Law and Policy by N Grover, 1/e p29]*

258. Ans. (a) Alcohol; (d) Nicotine *[Ref. Narcotics Control Bureau, India]*

259. Ans. (b) The Mental Health Care Act *[Ref. Ministry of Health and Family Welfare, Government of India, 2013]*

Mental Health Care Act, 2011

Recognizing That

Persons with mental illness constitute a vulnerable section, and are subject to discrimination; Families bear disproportionate financial, physical, mental, emotional and social burden of providing treatment and care; Persons with mental illness should be treated like other persons with health problems. The Mental Health Act, 1987 has not been able to adequately protect the rights of persons with mental illness and promote access to mental health care in the country

And in Order to:

- Protect, promote and fulfill the rights of persons with mental illness during the delivery of health care in institutions and in the community; Ensure health care, treatment and rehabilitation to persons with mental illness is provided in the least

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restrictive environment possible, and in a manner that does not intrudes on their rights and dignity. Community-based solutions in the vicinity of the person's usual place of residence, are preferred to institutional solutions; Provide treatment, care and rehabilitation to improve the capacity of the person to develop his or her full potential and to facilitate his or her integration into community life; Fulfill obligations under the Constitution of India and obligations under various International Conventions ratified by India; Regulate the public and private mental health sectors within a rights framework to achieve the greatest public health good; Improve accessibility to mental health care by mandating sufficient provision of quality public mental health services and non-discrimination in health insurance; Establish a mental health care system integrated into all levels of general health care; Promote principles of equity, efficiency and active participation of all stakeholders in decision making;

- This Act may be called the Mental Health Care Act, 2011.

260. Ans. (c) Fundamental rights of mentally retarded

[Ref. The Mental Health Care Bill 2011 DRAFT, MOHFW, Government of India p6]

- Under Mental Health Care Act of India 2011, Mental retardation has been EXCLUDED from definition of mental illness

261. Ans. (d) Jaipur *[Ref. CDSCO Website]*

CDSCO (Central Drugs Standards Control Organization) Offices

- Ghaziabad (North Zone)
- Mumbai (West Zone)
- Chennai (South Zone)
- Kolkata (East Zone)
- Ahmedabad (Zone)
- Hyderabad (Zone)
- Bangalore (Subzone)
- Chandigarh (Subzone)
- Jammu (Subzone)
- Goa (Subzone)

262. Ans. (c) Calculating probability of adverse drug reaction *[Ref. Clinical Pharmacology and Rational Therapeutics by Rataboli, 2/e p459]*

263. Ans. (c) 'Mentally ill' in place of lunatic *[Ref. MTP Act 1971 Amendment 2002 document]*

264. Ans. (a) MTP act; (b) ESI act; (d) Factory act *[Ref. Park 23/e p506, 815, 816]*

265. (c) Ministry of Health and Family Welfare *[Ref. FSSAI, MOHFW, GOI]*

FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA (FSSAI)

- *Background*: Established under Food Safety and Standards Act, 2006
- *Head office*: New Delhi
- *Function*:
  - Lay down Science-based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption
  - Various Central Acts like Prevention of Food Adulteration Act 1954, Milk and Milk Products Order 1992, etc. to be repealed
  - Single reference point for all matters relating to food safety and standards
- Establishment of the Authority: Ministry of Health & Family Welfare, Government of India is the Administrative Ministry for the implementation of FSSAI

266. (b) 200 mg of mifepristone on D_1 followed by 400 µg of misoprostol on D_3 *[Ref. Medical Methods of Abortion, GOI 2013 Guidelines, p13]*

PROTOCOL FOR MEDICAL METHODS OF ABORTION (GOI)

Visit	Day	Drug(s) used
First	Day 1	- 200 mg Mifepristone orally - Anti D, if Rh negative

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Second	Day 2 or Day 3	**For gestation upto 49 days** - 400 mcg Misoprostol orally or vaginally **For gestation upto 63 days** - 800 mcg Misoprostol sublingually or vaginally - Analgesics Home administration by woman may be tried in few cases
Third	Day 15	- Confirm and ensure completion of procedure - Contraceptives

Review Questions

267. Ans. (b) 100 mg of elemental iron and 500 mg of folic acid *[Ref. Park 23/e p642]*

268. Ans. (b) 2005 *[Ref. Internet]*

269. Ans. (c) ELISA *[Ref. Park 23/e p350]*

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CHAPTER 7

Demography, Family Planning and Contraception

DEMOGRAPHY

DEMOGRAPHIC CYCLE AND PROCESSES

Demography and Demographic Processes

- *Demography*: Is the scientific study of human population; It focuses attention on[Q],
  - Changes in population size
  - Composition of population
  - Distribution of population in space
- *Types of demography*:
  - *Formal demography*: Measurement of populations processes
  - *Social demography*: Also analyze relationships between economic, social, cultural and biological processes influencing a population
- *Basic demographic equation*: If a country has Population 't' persons at the time 't', then size of population at time 't + 1' will be, (Natural increase t =Births t – Deaths t;

  Net migration t =Immigration t – Emigration t)

  Population t +1 = Population t + Natural increase t + Net migration t
- *Demographic Processes:* 5 processes continuously on work in a population, thus determining its' size, composition and distribution[Q]
  - Fertility
  - Marriage
  - Mortality
  - Migration
  - Social mobility

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Demographic Processes:
- Fertility
- Marriage
- Mortality
- Migration
- Social mobility

Important Definitions in Demography

- *Crude birth rate (CBR):* Annual number of live births per 1000 mid year population[Q]
- *General fertility rate (GFR):* Annual number of live births per 1000 women of childbearing age (15–49 years old, or 15–44 years old) mid-year population[Q]
- *General marital fertility rate (GMFR):* Annual number of live births per 1000 married women of childbearing age (15–49 years old, or 15–44 years old) mid-year population
- *Age-specific fertility rates (ASFR):* Annual number of live births per 1000 women in particular age groups (usually age 15–19 years, 20–24 years etc)
- *Crude death rate (CDR):* Annual number of deaths per 1000 mid year population[Q]
- *Infant mortality rate (IMR):* Annual number of deaths of children less than 1 year old per 1000 live births[Q]
- *Expectation of life (Life expectancy):* The number of years which an individual at a given age could expect to live at present mortality levels
- *Total fertility rate (TFR):* Number of live births per woman completing her reproductive life, if her childbearing at each age reflected current ASFRs[Q]
- *Gross reproduction rate (GRR):* Number of daughters who would be born to a woman completing her reproductive life at current ASFRs[Q]
- *Net reproduction rate (NRR):* Expected number of daughters, per newborn prospective mother, who may or may not survive to and through the ages of childbearing[Q]

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General fertility rate (GFR): Annual number of live births per 1000 women of childbearing age (15–49 years old, or 15–44 years old) mid-year population[Q]

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Demographic Cycle and Concepts

- *Demographic cycle is closely related to:* Socio-economic progress of a country
- *5 stages (phases) of demographic cycle through which a nation passes:*

	Phase I	Phase II	Phase III[Q]	Phase IV	Phase V
Birth rate	High	High	Declining	Low	Low
Death rate	High	Declining	Declining	Low	Declining
DG	Narrow	Increasing	Decreasing	Narrow	Reversal
Population	Stationary	Growing*	Growing$	Stationary	Decreasing
Composition	Young	Young	Young	Mixed	Ageing
Age pyramid	Pyramidal	Losing pyramidal shape	Globular	Cylindrical	Losing cylindrical shape

(*: Increasing rate; $ Decreasing rate)

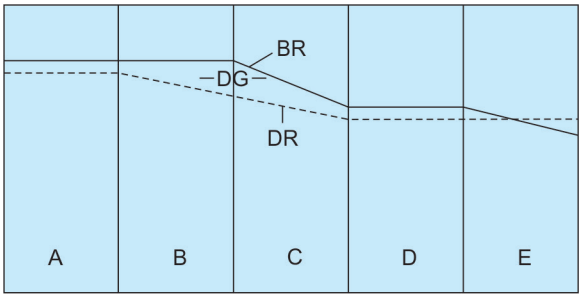

Figure: Stages of demographic cycle

[BR-birth rate, DR-death rate, DG-demographic gap, A-high stationary stage, B-early expanding stage, C-late expanding stage, D-low stationary stage, E-declining stage]

I *India is in Stage III (Late Expanding Phase) of Demographic cycle[Q]*

- *India is in Stage III (Late Expanding Phase) of Demographic cycle[Q]*
- *Stage V (Decline Phase):* Germany, Italy, Spain, Portugal, Greece, United Kingdom and Japan (populations are reproducing well < replacement levels)
- *Demographic transition:* is a model used to explain the process of transition from high BR and high DR to low BR and low DR as part of the economic development of a country from a pre-industrial to an industrialized economy
- *Demographic Window:* Period of time in a nation's demographic evolution when 'proportion of population of working age group is particularly prominent'
  - Typically, demographic window of opportunity lasts 30–40 years
  - *UN Population Department definition:* Period when the proportion of children and youth under 15 years falls < 30% and proportion of people 65 years and older is still < 15%
  - Countries status of demographic window:
    - *Europe:* 1950 – 2000
    - China: 1990 – 2015
    - *India*: *2010 – 2050* (*expected*)
    - *Africa:* 2045 – ? (expected)
- *Demographic dividend:* A rise in the rate of economic growth due to a rising share of working age people in a population
  - It usually occurs late in the demographic transition when the fertility rate falls and the youth DR declines
  - In this demographic window opportunity, output per capita rises
- *Demographic gift:* The initially favorable effect of falling fertility rates on the ratio of the working population to the dependent population
- *Demographic trap:* Applies to a country whose population is growing rapidly due to a high BR and low DR[Q]

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- *Epidemiological transition:* A change in the pattern of disease in a country away from infectious diseases towards degenerative diseases

BIRTH RATE, DEATH RATE AND GROWTH RATE

Crude Birth Rate (CBR) and Crude Death Rate (CDR)

- *Crude birth rate (CBR):* is the natality or childbirths per 1,000 mid-year population[Q]
  - *CBR (World):* 19.9 per 1000 population (Max 51 Niger; Min 7 Monaco) [2012]
  - *CBR (India):* 21.4 per 1000 population [2014][Q]
  - Is a measure of fertility
- *Crude Death Rate (CDR):* is the mortality per 1,000 mid-year population[Q]
  - *CDR (World):* 8.37 per 1000 population (Max 22 Lesotho; Min 1 UAE) [2011]
  - *CDR (India):* 7.0 per 1000 population [2014][Q]
  - CRUDE means it includes all causes and all ages - It is independent of age of population[Q]

Crude birth rate (CBR): is the natality or childbirths per 1,000 mid-year population[Q]

Growth Rate

- *Growth rate (GR):* Is the change in population overtime, and can be quantified as the 'change in the number of individuals in a population per unit time'
  - *Annual growth rate (AGR):* Crude birth rate (BR) minus crude death rate (DR)[Q]
  - *Decadal growth rate (DGR):* Change in population over a decade
- *Growth rate (India):* [Census 2011]
  - *Annual growth rate (AGR):* 1.64%[Q]
    - Since India's AGR is 1.64%, it is in very rapid growth phase; Population of India will double in 35 – 47 years
  - *Decadal growth rate (DGR):* 17.64%
    - Highest DGR: Dadra and Nagra Haveli (55.5%)
    - Lowest DGR: Nagaland (–0.47%)
- *Growth rate (World):* 1.17% [UN World's Population Prospects Report 2006]
  - *Growth rates of countries:* [UN World's Population Prospects Report 2006]
    - *Rank 1:* Liberia (4.5%) Highest growth rate[Q]
    - *Rank 3:* Afghanistan (3.85%)
    - *Rank 90:* India (1.46%)
    - *Rank 230:* Cook's Islands (– 2.23 %) *Lowest growth rate*
- *Relation between annual growth rate (AGR) and population:*

Rating	Annual GR (%)	Population doubling time
Stationary population	None	-
Slow growth	< 0.5	> 139 years
Moderate growth	0.5 – 1.0	139 – 70
Rapid growth	1.0 – 1.5	70 – 47
Very rapid growth[Q]	**1.5 – 2.0**	**47 – 35[Q]**
Explosive growth	2.0 – 2.5	35 – 28
Explosive growth	2.5 – 3.0	28 – 23
Explosive growth	3.0 – 3.5	23 – 20
Explosive growth	3.5 – 4.0	20 – 18

- *Growth ratio* = Growth rate × 100%
  - *Positive growth ratio:* population is increasing
  - *Negative growth ratio:* population is declining
  - *Growth ratio of zero:* There were the same number of people at the two times (or net difference between births, deaths and migration is zero)

India's AGR is 1.64%

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Population Growth Models

- *Malthusian Growth Model:* (Simple exponential growth model)
  - Essentially exponential growth based on a constant rate of compound interest
  - *RULE OF 70:* explains the time periods involved in exponential growth at a constant rate. For example, if growth is measured annually then a 1% growth rate results in a doubling every 70 years. At 2% doubling occurs every 35 years.
- *Logistic growth model:* The Malthusian growth model is the direct ancestor of the logistic function

POPULATION PYRAMID

Carrying Capacity

- *Carrying capacity:* The supportable population of an organism, given the food, habitat, water and other necessities available within an ecosystem is known as the ecosystem's *carrying capacity* for that organism
  - Refers to the number of individuals who can be supported in a given area *within natural resource limits*, and without degrading the natural social, cultural and economic environment for present and future generations
  - For human population more complex variables (sanitation, medical care) are sometimes considered as part of necessary infrastructure
  - Below carrying capacity, populations typically increase; while above, they typically decrease
  - May depend on a variety of factors including food availability; water supply, environmental conditions and living space

Population Pyramid (Age-Sex Pyramid)

- *Population composition of India*[Q]*:* [NFHS – 3, 2005–06]
  - *0 – 14 years:* 34.9% (Children)
  - *15 – 49 years:* 49.5% (Reproductive age group)
  - *50 – 59 years:* 7.1%
  - *60 years:* 8.5% (Geriatric age group)
- *Population pyramid:* (age-sex pyramid and age structure diagram[Q]) Is a graphical illustration that shows the distribution of various age groups in a population which normally forms the shape of a pyramid
  - *Double Histogram*[Q]*:* 2 back-to-back histograms
    - one showing the number of males and
    - one showing females in a particular population (Males are conventionally shown on left and females on right)
  - Population (%) is plotted on the X-axis and age on the Y-axis (in 5-year age group intervals)
- *Types of Population pyramid:*
  - *Stationary pyramid:* A population pyramid showing an unchanging pattern of fertility and mortality
  - *Expansive pyramid*[Q]*:* A population pyramid showing a broad base, indicating a high proportion of children, a rapid rate of population growth, and a low proportion of older people
    - Indicates a population in which there is a high birth rate, a high death rate and a short life expectancy
    - Typical pattern for less economically developed countries
  - *Constrictive pyramid:* A population pyramid showing lower numbers or percentages of younger people
    - Country will have a greying population which means that people are generally older

I Population pyramid: Double Histogram

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- *Utility of Population pyramid:*
  - *Shape of population pyramid indicates fertility pattern*
    - *Broad base, Narrow top (upright triangle):* High proportion of younger population (developing countries[Q])
    - *Bulge in Middle, Spindle shape:* High proportion of adults (developed countries[Q])
  - *Span (height) of population pyramid indicates life expectancy*
    - *Taller pyramid:* Higher life expectancy (developed countries[Q])
    - *Shorter pyramid:* Lower life expectancy (developing countries[Q])
  - *Symmetry of population pyramid indicates sex ratio*
    - *Symmetric pyramid:* ideal sex ratio (developed countries[Q])
    - Asymmetric pyramid: unfavourable sex ratio <1000 (developing countries[Q])

SEX RATIO AND DEPENDENCY RATIO

Sex Ratio

- Sex Ratio: Is defined as number of females per thousand males[Q]

$$\text{Sex Ratio} = \frac{\text{No. of Females}}{\text{No. of Males}} \times 1000$$

- *Sex Ratio (India):* [Census 2011]
  - *Sex ratio (India):* 940[Q] *(Highly unfavourable)*
    - *Sex ratio (Rural India):* 947
    - *Sex ratio (Urban India):* 926
  - *Favourable sex ratio in India:*
    - *Kerala:* 1084[Q]
    - *Pondicherry:* 1038

I *Sex ratio (India):* 940

- *Census 2011 data for sex ratio (India):*

Census 2011		Sex ratio
State with Highest Sex Ratio	Kerala[a]	1084
State with Lowest Sex Ratio	Haryana[a]	877
UT with Highest Sex Ratio	Pondicherry	1038
UT with Lowest Sex Ratio	Daman & Diu[a]	618
District with Highest Sex Ratio	Mahe (Pondicherry)	1176
District with Lowest Sex Ratio	Daman (Daman & Diu)	533

- *Types of sex ratio:*
  - *Primary sex ratio:* Ratio at the time of conception
  - *Secondary sex ratio:* Ratio at time of birth
  - *Tertiary sex ratio:* Ratio of mature organisms[Q]
- *Interpretation of Sex ratio:*
  - *Ideal Sex Ratio:* Sex ratio of 1000 (equal no. of males & females)
  - *Favourable Sex Ratio:* Sex ratio > 1000 (Females > Males)
  - *Unfavourable Sex Ratio:* Sex ratio < 1000 (Females < Males)
- *Natural sex ratio at birth (estimated):* 950
- *Evolutionary stable sex ratio:* Ideal sex ratio (= 1000 or 50:50 males : females)
- *Sex ratio is an important and sensitive indicator of status of women*[Q]

Child Sex Ratio (CSR)

- *Child Sex Ratio:* Is defined as number of female children 0 – 6 years age per thousand male children 0 – 6 years age[Q]
  - *Child Sex Ratio (India):* 914[Q] [Census 2011] (Highly unfavourable)
  - *Highest:* Mizoram; *Lowest:* Haryana

I Child Sex Ratio (India): 914

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Dependency Ratio

- *Dependency Ratio (DR):* The proportion of persons above 65 years of age and children below 15 years of age are considered to be dependent on economically productive age group (15 – 64 years) [Q]
  - DR is ratio dof the economically dependent part of the population to the productive part
  - DR is the 'age-wise' ratio of non-earning to earning population.
  - DR is also known as *'Societal Dependency ratio (SDR)'*

$$\frac{\text{Population} < 15 \text{ years} + \text{Population} > 65 \text{ years}}{\text{Population 15-65 years}}$$

  - *DR is of two types:*
    - Young age DR (0 – 14 years)
    - Old age DR (> 65 years)
- *Importance of DR:* As DR increases, there is increased strain on the productive part of the population to support the upbringing and pensions of the economically dependent
  - *DR is CRUDE:* It fails to take into account the earning population in numerator and non-earning population in denominator
- *DR (India) is 62 per 100 or 0.62:* It implies 100 earning people in India are supporting 162 people (100 themselves and 62 non-earning dependents on them)
- *DR (India) projected in forthcoming years:*
  - DR will decrease
  - Young age DR will decrease
  - Old age DR will increase

LITERACY AND LIFE EXPECTANCY

Literacy

- *Literate (India)*[Q]*:* Any person who can read AND write, WITH understanding, IN ANY ONE language of India AND who is > 7 years if age (definition used in 1991 & 2001 Censuses)
  - *Literacy Rate:* Denominator is population > 7 years age[Q]
  - *Crude Literacy Rate:* Denominator is total population (used earlier) [Q]
  - *UN definition of Literacy:* Ability to read and write a simple sentence in any language[Q]
- *Literacy Rate (India)*[Q]*:* 74.04% [Census 2011]
  - *Literacy rate by sex*[Q]*:* Males – 82% & Females – 65%
  - *Literacy rate by state*[Q]*:* Maximum 94% (Kerala) & Least 64% (Bihar)
- *Literacy Rate (World):* 82% [CIA World Factbook 2007]
  - *Literacy rate in countries:* [UNDP Programme report 2007-08]
    - *Rank 1:* Georgia (100%)
    - *Rank 173:* Burkina Faso (23.6%)
- *Indian Government Schemes for Literacy:*
  - *Sarva Siksha Abhiyan (2001):* All children in the age 6-14 years attend school and complete 8 years of schooling by 2010[Q]
  - *District Primary Education Programme (1994):* Centrally sponsored; has so far opened more than 160,000 new schools, including almost 84,000 alternative schools.
  - *Mid day meal programme (1995)*[Q]
  - *National Literacy Mission (1988):* Aims at attaining a literacy rate of 75% by 2007
- *International Literacy Day*[Q]*:* 8th September (every year)
- *Threshold level of literacy:* 75%

I

Literacy Rate (India)[Q]: 74.04% [Census 2011]

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- *Types of Literacy:*
  - *Functional Literacy:* Ability of an individual to use reading, writing, and computational skills efficiently in everyday life situations[Q]
  - *Transliteracy:* The ability to read, write and interact across a range of platforms, tools and media from signing and orality through handwriting, print, TV, radio and film, to digital social networks
  - *Alliteracy:* The state of being able to read but being uninterested in doing so

FERTILITY

Total Fertility Rate (TFR)

- Is STANDARDIZED INDEX FOR FERTILITY LEVEL[Q]
- Average no. of children a woman would bear in her reproductive life span; Also known as *'Period Total Fertility Rate'*
- Gives magnitude of approximately *'completed family size'*[Q] – no. of alive children in a family
- Obtained by summing single-year age-specific rates (ASFRs) at a given time[Q]
- *TFR is a synthetic rate*[Q]*:* Is not actually counted, as this would involve waiting until women complete childbearing
- *TFR (India):* 2.68 [NFHS – 3, 2005 – 06]
- *Replacement level of fertility (TFR = 2.1)*[Q]*:* TFR at which newborn girls would have an average of exactly 1 daughter over their lifetimes (women have just enough babies to replace themselves)
  - Replacement TFR (industrialized countries) = 2.1
  - Replacement TFR (developing countries) = 2.5 – 3.3
  - Replacement TFR (globally) = 2.33
- *Total cohort fertility rate (TCFR) is a better estimate of completed family size than TFR*

> I
> Total Fertility Rate (TFR) Gives magnitude of approximately *'completed family size'*

Fertility Rates

- *GFR is a better measure of fertility than CBR:* Number of live births per 1000 women in reproductive age group (15-49 years)[Q]
  - Major weakness of GFR: Not all women are exposed to risk of child birth
- *Total Fertility Rate (TFR):* Average no. of children a woman would bear in her reproductive life span. Also known as 'Period Total Fertility Rate'
  - Gives magnitude of approximately '*completed family size*' – no. of alive children in a family[Q]
  - Obtained by summing single-year age-specific rates (ASFRs) at a given time[Q]
  - TFR is a synthetic rate: Is not actually counted, as this would involve waiting until women complete childbearing[Q]
- *Gross Reproduction Rate (GRR):* Measures the no. of daughters a woman would have in her lifetime if she experiences prevailing age-specific fertility, 'assuming no mortality'[Q]
  - GRR is same as the NRR, except that, like the TFR, it ignores life expectancy
- *Net Reproduction Rate (NRR):* Number of daughters a newborn girl will bear during her lifetime assuming fixed age-specific fertility and mortality rates.
  - *NRR = 1:* Each generation of women is exactly reproducing itself[Q]
  - *To achieve NRR =1*[Q]*:* Couple Protection Rate (CPR) should be >60%
  - GRR or NRR = ½ TFR (approximately)[Q]

> I
> To achieve NRR =1[Q]: Couple Protection Rate (CPR) should be >60%

MISCELLANEOUS (DEMOGRAPHY)

Uses of Regular Reporting of Health Statistics[Q]

- To measure health status of population
- To quantify health related problems
- To evaluate trends of disease in a population

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- To compare health data locally, nationally and internationally
- To effective plan health programs, policies, services
- To monitor and evaluate health programs
- To evaluate satisfaction among population
- To appreciate health personnel's efforts
- To promote epidemiological research

Sample Registration System

I

SRS is a dual record system:

- *Sample Registration System (SRS)* was initiated in 1964–65 (on a pilot basis; full scale from 1969–70) to provide national as well as state level reliable estimates of fertility and mortality
- *SRS is a dual record system:*[Q]
  - *Field Investigation:* continuous enumeration of births and deaths by an enumerator
  - *Independent retrospective survey:* every 6 months by an investigator-supervisor[Q]
- *Advantages of SRS as a dual record system:*
  - Elimination of errors of duplication
  - Leads to a quantitative assessment of the sources of distortion in the two sets of records making it a self evaluating technique.
- *Primary objective:* To build up statistics on *'Most Probable Causes of Death'* for rural and urban areas using *lay diagnosis reporting (Post Death Verbal Autopsy*[Q]*)'* method
- *Main objective of SRS:* To provide reliable estimates of BR, DR and IMR at the natural division level for rural areas and at the state level for urban areas[Q]
- *Main components of SRS:*
  - Base-line survey of the sample units to obtain usual resident population of the sample areas
  - Continuous (longitudinal) enumeration of vital events pertaining to usual resident population by the enumerator
  - Independent retrospective half-yearly surveys for recording births and deaths which occurred during the half-year under reference and updating the Houselist, Household schedule and the list of women in the reproductive age group along with their pregnancy status by the Supervisor
  - Matching of events recorded during continuous enumeration and those listed in course of half-yearly survey
  - Field verification of unmatched and partially matched events
  - Filling of Verbal Autopsy forms for finalized deaths
- *Sample design adopted for SRS:* A unistage stratified simple random sample[Q]
  - Infant Mortality is the decisive indicator for estimation of sample size at Natural Division
- SRS now covers the entire country
- *Findings of SRS Bulletin: [2014]:*
  - Crude Birth Rate (CBR): 21.4 per 1000 mid-year population
  - Crude Death Rate (CDR): 7.0 per 1000 mid-year population
  - Natural Growth Rate: 14.5 per 1000 mid-year population
  - Infant Mortality Rate (IMR): 40 per 1000 live births

Civil Registration System

I

Births must be registered within: 21 days
Deaths must be registered within: 21 days

- *Civil Registration System (CRS):* Birth and death registration system is technically known as CRS[Q]
- Registration of births and deaths (Birth and Death Registration Act, 1969) and marriages is compulsory at their place of occurrence with local registrar in India
  - *Births must be registered within:* 21 days[Q]
  - *Deaths must be registered within:* 21 days[Q]
  - *Marriages must be registered within:* Variable limits within India
- *In cases of delayed registration for birth/ death:*
  - *After 21 days till 30 days: Late fee*

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  - *After 30 days till 1 year:* Late fee + Written permission from district registrar (vide an affidavit)
  - *After 1 year:* Late fee + Order of executive magistrate
- *Registration of name of the child:*
  - *Within 12 months of birth registration:* Free of charge
  - *After 12 months of birth registration till 15 years:* Rupees 5.00
- Coverage of registration of births and deaths in India
  - *Coverage of births registration in Indio:* 55%
  - *Coverage of deaths registration in India:* 46%

Key Facts of Census (India) 2011

- *Frequency of census in India*[Q]*:* Every 10 years (decadal)
- *Legal basis of conducting census:* The Census Act, 1948[Q]
- *The census organization set up and working under:* Ministry of Home Affairs[Q]
- *Head of census organization:* Registrar General and Census Commissioner[Q]
- *Population enumeration:* 9th – 28th February 2011
- *Revisional round:* 1st – 5th March 2011
- *Houseless population enumeration:* Night of 28th February 2011
- *Districts covered:* 640[Q]
- *Census Stop (Census Movement)*[Q]*:* 00.00 hrs 01 March 2011 (The referral time and date at which snapshot of the population is taken)
- FIRST TIME ACTIVITIES EVER DONE: BIOMETRY[Q]
  - Finger prints – 10
  - Iris scan
  - National population register (NPR)
  - UID – Unique identification number
  - Photograph

I Census Stop (Census Movement)[Q]: 00.00 hrs 01 March 2011

Key Findings of Census of India 2011

- *35 States & UTs; 640 districts; 6.41 lac villages*
- Total population — 1210.1 million (M : F = 51.4 : 48.6)
  - Highest population — Uttar Pradesh (199 million)
  - Lowest population — Lakshadweep (64000)
- Sex ratio — 940[Q]
  - Highest sex ratio — Kerala (1084) [Q]; Puducherry (1038)
  - Lowest sex ratio — Daman & Diu (618) [Q]; Dadra & Nagar Haveli (775); Chandigarh (818); Delhi (866); Haryana (877) [Q]
- Child Sex Ratio (0-6 y) — 914[Q]
  - Highest CSR — Mizoram (971)
  - Lowest CSR — Haryana (830)
- Literacy rate — 74.04%[Q]
  - LR Males — 82.14%[Q]
  - LR Females — 65.46%[Q]
  - LR Highest — Kerala (93.9%)[Q]
  - LR Lowest — Bihar (63.8%)
- Density of population — 382[Q]
  - Highest density — Delhi (11,297)
  - Lowest density — Arunachal Pradesh (17)
- Growth rate annual — 1.64%[Q]
- Growth rate decadal — 17.64%
  - Highest DGR — Dadra & Nagar Haveli (55.5%)
  - Lowest DGR — Nagaland (–0.47%)

National Family Health Survey (NFHS)

- Is a large-scale, multi-round survey conducted in a representative sample of households throughout India

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I 3 rounds of the NFHS survey have been conducted till date

- *3 rounds of the NFHS survey have been conducted till date*[Q], [NFHS-4 2014-15 ongoing]
  - NFHS–1: 1992–93
  - NFHS–2: 1998–99
  - NFHS–3: 2005–06
- *Goals of NFHS survey:*
  - To provide essential data needed by Ministry of Health & Family Welfare and other agencies for policy and programme purposes
  - To provide information on important emerging health and family welfare issues
- *Main objective of NFHS survey:* To provide state and national information for India on fertility, infant and child mortality, the practice of family planning, maternal and child health, reproductive health, nutrition, anaemia, utilization and quality of health and family planning services
- *Nodal agency for NFHS:* International Institute for Population Sciences (IIPS), Mumbai[Q]
- *Few key findings of NFHS–3, India (2005–06)*[Q]*:*
  - Literacy rate: Male – 83%, Female – 59%
  - IMR: 57 per 1000 live births
  - TFR: 2.6[Q]
  - Contraceptive prevalence: 56% (Sterilization: 37%)[Q]
  - 3 AN check ups: 51%
  - *Took IFA:* 65% (Took IFA for 90 days or more: 23%)
  - *Received > 2 TT injections:* 76%[Q]
  - *Institutional deliveries:* 41%[Q]
  - *Delivery assisted by health professionals:* 48%
  - *Delivery conducted by a skilled provider:* 47%
  - *Anemia – children:* 79%[Q]
  - *Anemia – pregnancy:* 58%[Q]
  - *Women experienced domestic violence:* 37%[Q]

Key Age-group Definitions

I Perinatal period[Q]: 28 weeks POG – 7 days post-delivery

- *Ovum:* 0 – 2 weeks
- *Embryo:* 2 – 9 weeks
- *Fetus:* 9 weeks – delivery
- *Period of viability*[Q]*:* POG > 28 weeks
- *Perinatal period*[Q]*:* 28 weeks POG – 7 days post-delivery
- *Neonatal period*[Q]*:* 0 – 28 days after birth (0 – 4 weeks post-delivery)
  - *Early neonatal period:* 0 – 7 days after birth (1st week)
  - *Late neonatal period:* 8 – 28 days after birth (2 – 4 week)
  - *Post neonatal period:* 29 days – 365 days after birth (1 month – 1 year)
- *Infancy*[Q]*:* Birth – 365 days (1st year of life)
- *Toddler:* 1 – 3 years age
- *Preschool child:* 3 – 6 years age
- *Puberty:* Is the stage of the lifespan in which a child develops secondary sex characteristics as his/her hormonal balance shifts strongly towards an adult state
  - *Average age for onset in girls:* 10-12 years[Q]
  - *Average age for onset in boys:* 12-14 years[Q]

I Adolescent: 10 – 19 years age

- *Adolescent:* 10 – 19 years age (WHO definition[Q])
  - *Early adolescence:* 10 – 13 years
  - *Mid adolescence:* 14 – 16 years
  - *Late adolescence:* 17 – 19 years
- *Youth:* 15 – 24 years age group (UN definition[Q])
- *Reproductive age group:* 15 – 44 years or 15 – 49 years age
- *Geriatric age (India):* > 60 years[Q]
- *Legal age of marriage in India:* 18 years for girls and 21 years for boys[Q]
- *Legal age for voting in India:* 18 years for both boys and girls

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- *Legal age for employment in India:* > 14 years[Q]
- *Legal age of consent by a girl for sexual intercourse in India:* 18 years[Q] [NEW GUIDELINE 2012]
- *Juvenile in India:* Boy less than 18 years and girl less than 18 years [NEW GUIDELINE 2011]
- *Major in India:* 18 years and above
- *Tobacco products cannot be sold in India:* To age below 18 years[Q]
- *Alcohol cannot be sold in India:* To age below 25 years[Q]

I Legal age for employment in India: > 14 years[Q]

I Juvenile in India: Boy less than 18 years and girl less than 18 years

FAMILY PLANNING AND CONTRACEPTION

CONCEPTS OF FAMILY PLANNING

Definitions and Concepts

- *Birth control (contraception):* Is a regimen of one or more actions, devices, or medications followed in order to deliberately prevent or reduce the likelihood of pregnancy or childbirth. It is commonly used as part of family planning
- *Contraception:* May refer specifically to mechanisms which are intended to reduce the likelihood of the fertilization of an ovum by a spermatozoon
- *Family planning:* A couple plans when to have children, using birth control and other techniques (sexual education, prevention and management of STIs, preconceptional counselling & management, and infertility management).
- *Modern concept of family planning:* Family planning is not synonymous with birth control only. A WHO Expert Committee (1970) recommends that family planning includes in its' purview[Q]:
  - Proper spacing and limitation of births
  - Advice on sterility
  - Education for parenthood
  - Sex education
  - Screening for pathological conditions related to reproductive system (e.g. Cervical cancer)
  - Genetic counseling
  - Marriage counseling
  - Premarital consultation and examination
  - Carrying out pregnancy tests
  - Preparation of couples for arrival of their 1st child
  - Providing services for unmarried mothers
  - Teaching home economics and nutrition
  - Providing adoption services

Contraceptive Efficacy

- *Contraceptive Efficacy:* Is assessed by measuring the number of unplanned pregnancies that occur during a specified period of exposure and use of a contraceptive method. Two methods used are[Q]:
  - Pearl Index[Q]
  - Life table analysis[Q]

Pearl Index (PI)

- *PI or Pearl rate:* MC technique used in clinical trials for measuring the effectiveness of a birth control method
  - PI is no. of failures per 100 woman years (HWY) of exposure[Q]

$$\text{Pearl Index (PI)} = \frac{\text{Total accidental pregnancy}^{Q}}{\text{Total months of exposure}} \times 1200$$

I PI is no. of failures per 100 woman years (HWY) of exposure

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- In designing a use-effectiveness trial, a 'minimum of 600 months of exposure' is required for a firm conclusion
- *Disadvantages for PI:*
  - PI assumes a constant failure rate over time
  - PI also provides no information on factors other than accidental pregnancy which may influence effectiveness calculations, viz. dissatisfaction with the method, trying to achieve pregnancy, medical side effects, lost to follow up
  - PI is only accurate as a statistical estimation of per-year risk of pregnancy if the pregnancy rate was very low
- *Pearl Indices for few contraceptive methods:*

Contraceptive Method	Pearl Index (per HWY)
No method used	80
Rhythm (calendar) Method	24
Coitus interruptus	18
Male condoms	2 – 14[a]
Female condoms	5 – 21
Diaphragm	12
Vaginal sponge *Parous women* *Nulliparous women*	 20 – 40 9 – 20
IUD	0.5 – 2.0[a]
Oral pill	0.1 – 0.5[a]
Centchroman (Saheli)	1.83 – 2.84

- *Second method for calculation of PI:* The number of pregnancies in the study is divided by the number of menstrual cycles experienced by women in the study, and then multiplied by 1300
  - 1300 instead of 1200 is used on the basis that the length of the average menstrual cycle is 28 days, or 13 cycles per year

$$\text{Pearl Index (PI)} = \frac{\text{Total accidental pregnancies}}{\text{Total no. of menstrual cycles experienced}} \times 1300$$

Life Table Analysis (LTA)

- *LTA as measure of contraceptive efficacy:* LTA calculates a failure rate per month of use[Q]
  - Better measure than PI[Q]

Eligible Couples

- *Eligible couples (ECs):* A currently married couple with wife in reproductive age group (15–45 years age)[Q]
  - There are 150 – 180 ECs per 1000 population in India[Q]
  - ECs are in need of family planning services
  - 20% ECs are in age group 20–24 years
- EC register, a basic document for organizing family planning work, is maintained at Subcentre[Q]

I EC register is maintained at Subcentre[Q]

Couple Protection Rate (CPR) and Effective CPR

- *Couple Protection Rate (CPR):* Is an indicator of prevalence of contraceptive practice in a community[Q]
  - *CPR is percent of eligible couples (ECs) protected* against one or the other approved methods of family planning, viz. condoms, OCPs, IUDs, sterilization[Q]
  - *NRR = 1 can be achieved if:* CPR >60%[Q]
  - *CPR (India):* 46% [2000]

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- *Goal for CPR in RCH – II (2004 – 09):* > 65%

$$\text{CPR} = \frac{\text{Total no. of ECs protected by any of 4 approved methods}}{\text{Total no. of ECs in the community}} \times 100$$

- *Effective Couple Protection rate (ECPR):*
  - *ECPR is percent of eligible couples (ECs) protected* against one or the other approved methods of family planning, viz. condoms, OCPs, IUDs, sterilization TAKING INTO ACCOUNT THEIR EFFECTIVITY[Q]
  - *Effectivity of approved contraceptive methods[Q]:*
    - Condoms: 50%
    - IUDs: 95%
    - OCPs: 100%
    - Sterilization (Vasectomy or Tubectomy): 100%

NATURAL METHODS

Natural Family Planning Methods

- *Safe period (Rhythm method/Calendar method):*
  - *Fertile period:* Shortest cycle minus 18 days (Last day of fertile period: Longest cycle *minus* 10 days)[Q]
  - *Drawbacks:*
    - Difficult to predict safe period in irregular cycles
    - Only suitable for educated couples with high motivation
    - PROGRAMMED SEX: Abstinence required for ½ month[Q]
    - Not useful in postnatal period
    - High failure rate: 9 per HWY[Q]
    - Medical complications: Ectopic pregnancies and embryonic abnormalities
- *Basal Body Temperature (BBT) Method:*
  - *Depends on:* Rise of temperature (0.3° – 0.5° C) at ovulation[Q]
  - *Occurs due to:* Increased progesterone production[Q]
  - *Measurement:* Before getting out of bed in morning (preferably)
  - *Reliable if:* Intercourse restricted to post-ovulatory infertile period
  - *Drawback:* Abstinence necessary for entire pre-ovulatory period
- *Cervical Mucus Method:*
  - Also known as *'Billing's Method'[Q] or 'Ovulation Method'[Q]*
  - *Based on:* Changes in characteristics of cervical mucus
  - At ovulation: Watery, clear, smooth, slippery, profuse (like Egg white)
  - After ovulation: Thickens and lessens in quantity
  - Method: Tissue paper to wipe off inside of vagina
  - Drawback: Requires high degree of motivation
- *Symptothermic Method:*
  - Combines temperature, cervical mucus and calendar techniques[Q]
  - More effective than Billing's method[Q]
- *Sexual abstinence:*
  - *Only method of birth control which is completely effective:* Sexual abstinence[Q]
- *Coitus interruptus/Withdrawal method:*
  - *Oldest method of voluntary fertility control:* Coitus interruptus[Q]
- *Lactation amenorrhoea method (LAM):* A good method for natural conception under exclusive breast feeding

I (BBT) Method: Rise of temperature (0.3° – 0.5° C) at ovulation[Q]

BARRIER METHODS

Condoms

- *Major advantage:* Protection against HIV and other sexually transmitted infections (STIs)

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- *Male condoms versus female condoms:*

Characteristic	Male condoms	Female condoms
Material commonly used	Latex	Polyurethane/Nitrile
Pearl Index (failure rate)	2–14 per HWY[Q]	5–21 per HWY
No. of rings	1	2 (outer & inner)
Reusable	No	Yes
Covering skin around external genitals	No	Yes[Q]
Compatible with oil based lubricants	No	Yes
Insertion requires male erection	Yes	No
Prevention of pregnancy	Yes	Yes
Prevention of STIs	Yes[Q]	Yes[Q]

Female Condoms

- *Female condoms:* A device that is used during sexual intercourse
- *Invented by Danish MD Lasse Hessel*[Q]
- It is worn internally by the receptive partner and physically blocks ejaculated semen from entering that person's body
- Prevent pregnancy and transmission of STIs
- *Three types:*
  - FC Female condom: made of polyurethane
  - FC2: made of nitrile polymer
  - Latex
- Only tool for HIV prevention that women can initiate & control[Q]

Vaginal Sponge (TODAY)

- *VAGINAL SPONGE:* TODAY[Q] (brand name)
- *Sponge a barrier method of contraception:* It actually combines barrier and spermicidal methods to prevent conception[Q]
  - Is a small polyurethane sponge 5 cm × 2.5 cm
  - Saturated with 1000 mg of spermicide *'Non-oxynol–9'*[Q]
  - Today must be run under water till thoroughly wet before insertion
  - Sponges is '*inserted vaginally*' prior to intercourse and must be *'placed over the cervix to be effective'*[Q]
  - *Sponge must be left in place for 6 hours after ejaculation*[Q]*:* All sponges must be removed within the time limits specified by the manufacturer (24 hours for Today)
- *Disadvantages of sponge:*
  - Sponge provide no protection from STIs
  - Can lead to Toxic Shock Syndrome[Q]
  - Increased risk of yeast infection and UTI
- *Failure rate (Pearl Index):*
  - Parous women: 20 – 40 per HWY[Q]
  - Nulliparous women: 9 – 20 per HWY[Q]

Diaphragm

- *DIAPHRAGM:* Is a cervical barrier type of birth control
- *Mechanism of action:* It is a soft latex or silicone dome with a spring molded into the rim; the spring creates a seal against the walls of the vagina and blocks sperm from entering the female reproductive tract
- One teaspoon (5ml) of *spermicide* may be placed in the dome of the diaphragm before insertion, or with an applicator after insertion[Q]
- It must be inserted sometime before sexual intercourse, and remain in the vagina for 6-8 hours after a man's last ejaculation[Q]

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- *Protection against:* PID and Human Papilloma Virus (HPV) [Q]
- *Disadvantages:*
  - Increased risk of UTI, yeast infection & bacterial vaginosis
  - Toxic Shock Syndrome (if left in-situ > 24 hours) [Q]

IUDs

Types of Intrauterine Devices (IUDs)

- *Numbers (7, 220, 380) represent*[Q]*:* Surface area of copper (in sq. mm) on the device
- *B in CuT 220 B represent:* Size of IUD (IUDs were earlier available in different sizes – A, B, C and D; D was the largest size)
- *A or Ag in CuT 380 A represent*[Q]*:* Silver or Gold (with copper)

I Numbers (7, 220, 380) represent[Q]: Surface area of copper (in sq. mm)

1st Generation IUDs[Q]	2nd Generation IUDs[Q]	3rd Generation IUDs[Q]
Non-medicated IUDs *Inert IUDs*[Q]	*Medicated IUDs* *Bio-active IUDs*[Q]	
No medication is added to the IUD	Metallic ions (Copper) are added to IUD	Hormones are added to IUD
Lippes Loop Grafenberg's Ring	CuT 7 CuT 220 B CuT 380 A/Ag	Progestasert LNG – IUD

Shelf-life of IUDs

IUD	Approved years of use
Copper IUDs[Q]	3 – 5
Progestasert[Q]	1
CuT 200	4
NOVA T	5
LNG IUD	7 – 10
CuT 380 A[Q]	10

Mechanisms of Action of Intrauterine Devices (IUDs)[Q]

- *'Foreign body reaction':*
  - cellular/biochemical changes in endometrium/uterine fluids
  - impair viability of gamete
  - reduces chances of fertilization, rather than implantation
- *Copper in IUD:*
  - enhances cellular response in endometrium
  - affects enzymes in uterus
  - alter cervical mucus thus affecting sperm motility, capacitation & survival
- *Hormones in IUD:*
  - increase viscosity of cervical mucus
  - prevent sperm from entering cervix
  - make endometrium unfavorable to implantation (high progesterone & low estrogen)

Side Effects of IUD (Intrauterine Device) Insertion

- *Bleeding:*
  - *MC side effect of woman with IUD:* Increased vaginal bleeding[Q]
  - *Usually disappear by:* 1 – 2 months
  - *Leads to:* 10 – 20 % of all IUD removals (MCC removal: Pain[Q])
  - *Greater bleeding with:* Non-medicated (Inert) IUDs

I MC side effect of woman with IUD: Increased vaginal bleeding

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  - *Management of bleeding*[Q]*:*
    - Re-assure the female (DO NOT REMOVE IUD[Q])
    - Ferrous sulphate 200 mg TDS X 1 – 2 months
    - If bleeding is heavy or persistent: REMOVE IUD
- *Pain:*
  - *Second major side effect of IUD insertion*[Q]
  - *MCC requiring removal of IUDs*[Q]*:* Pain (15 – 40% removals)
  - *Usually disappear by:* 3 months
  - *Pain is more common in:*
    - Nullipara
    - Those who have not had child for many years
  - *Management of Pain*[Q]*:*
    - *Slight pain:* Analgesics like Aspirin or Codeine
    - *Intolerable pain:* Remove the IUD, insert a copper based device or advise other contraceptives
- *Pelvic infection (Pelvic Inflammatory Disease – PID):*
  - *PID include:* Acute, subacute and chronic infection of tubes, ovaries, uterus, connective tissue and pelvic peritoneum
  - *IUD increases risk of PID in a woman:* 2–8 times[Q]
  - *Higher risk of PID with IUD insertion:*
    - Women with greater no. of sexual partners
    - In first few months after insertion
  - *Clinical manifestations:* Vaginal discharge, pelvic pain & tenderness, abnormal bleeding, chills and fever
  - *Management of PID*[Q]*:*
    - Prompt treatment with broad spectrum antibiotics
    - If no response to antibiotics in 24 – 48 hours: Remove IUD
- *Uterine perforation:*
  - *Reported incidence:* 1:150 to 1:9000 insertions
  - *Incidence in hands of trained physicians:* <0.3% (< 30 per 1000)
  - *More common in*[Q]*:* IUD inserted in 48 hours-6 weeks postpartum
  - *Conclusive diagnosis:* Pelvic X-ray
  - *Management:* Removal of IUD
- *Pregnancy with IUD-in-situ:*
  - Actual use failure rate in 1st year: 3%
  - *Outcomes:* 50% spontaneous abortion, 25% only successful
  - *Management:*
    - If woman requests: Legally induced abortion
    - If woman wants to continue pregnancy and threads are visible: Remove IUD gently by pulling the threads
    - If woman wants to continue pregnancy and threads are NOT visible: Carefully examine for possible complications. If any sign of intrauterine infection – evacuation of uterus under broad spectrum antibiotic cover
- *Ectopic pregnancy with IUD-in-situ:*
  - *Women with IUDs be taught to recognize symptoms:* Lower abdominal pain, dark & scanty vaginal bleeding or amenorrhoea.
  - *Women with high risk of ectopic pregnancy:* should not use IUDs
- *Spontaneous expulsion:*
  - *Expulsion rate:* 12-20%
  - *Usually occurs in:* first few weeks following insertion or during menstruation
  - *Higher risk of expulsion*[Q]*:*
    - Young women
    - Nullipara women
    - Women who have had a postpartum insertion
    - Inert (Non-medicated IUDs)
- *Mortality associated with IUD use:*
  - Very low: ~1 death per 1,00,000 years of use
  - Safer than OCPs

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IUDs associated with Side-effects/Complications

Side effects or complications	IUD most commonly associated
Highest pregnancy rate[Q]	Lippes Loop
Lowest pregnancy rate[Q]	LNG – IUD
Highest expulsion rate[Q]	Lippes Loop
Lowest expulsion rate[Q]	Progestatsert
Highest removal rate[Q]	LNG – IUD
Lowest removal rate[Q]	Progestatsert

Contraindications for IUDs Use

- *Absolute contraindications*[Q]*:*
  - Suspected pregnancy
  - PID
  - Vaginal bleeding of undiagnosed etiology
  - Cancer of cervix, uterus or adnexa and other pelvic tumors
  - Previous ectopic pregnancy
- *Relative contraindications:*
  - Anemia
  - Menorrhagia
  - History of PID since last pregnancy
  - Purulent cervical discharge
  - Distortions of uterine cavity due to congenital malformations, fibroids
  - Unmotivated persons
- *The WHO Medical Eligibility Criteria for Contraceptive Use:*
  - *Category 3 (CuT NOT RECOMMENDED):*
    - Postpartum between 48 hours and 4 weeks
    - Benign gestational trophoblastic disease
    - Ovarian cancer
    - High likelihood of exposure to gonorrhea/chlamydial STIs
    - AIDS (unless clinically well on anti-retroviral therapy)
- *Category 4 (CuT CONTRAINDICATED*[Q]*):*
  - Pregnancy
  - Postpartum puerperal sepsis
  - Immediately post-septic abortion
  - Before evaluation of unexplained vaginal bleeding suspected of being a serious condition
  - Malignant gestational trophoblastic disease
  - Cervical cancer (awaiting treatment)
  - Endometrial cancer
  - Distortions of the uterine cavity by uterine fibroids or anatomical abnormalities
  - Current PID
  - Current purulent cervicitis, chlamydial infection, or gonorrheal STIs
  - Known pelvic tuberculosis

I

Absolute contraindications[Q]:
- Suspected pregnancy
- PID
- Vaginal bleeding of undiagnosed etiology
- Cancer of cervix, uterus or adnexa and other pelvic tumors
- Previous ectopic pregnancy

Ideal IUD Woman Candidate[Q] (Planned Parenthood Federation of America PPFA)

- Who has borne atleast one child
- Has no history of pelvic disease
- Has normal menstrual periods
- Is willing to check the IUD tail
- Has access to follow-up and treatment of potential problems
- Is in a monogamous relationship
- American College of Obstetricians and Gynaecologists (1985) stated that '*IUDs are not recommended for women who have not had children or who have multiple partners, because of the risk of PID and possible infertility*'

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Pregnancy Rates of IUDs (Clinical Experience)

Device	Pregnancy rate (%)	Expulsion rate (%)	Removal rate (%)
Lippes Loop[Q]	3	12 – 60	12 – 15
CuT 7	3	6	11
CuT 200	3	8	11
CuT 380 A	0.5 – 0.8	5	14[Q]
Progestasert	1.5	3	10
LNG IUD	0.2	6	17

Timings of IUD Insertion

- *During menstruation or within 10 days of beginning of menstrual period:*
  - Best time for IUD insertion[Q]
  - Cervical canal diameter greatest, lesser expulsion, least risk of pregnancy
- *Immediate post-partum insertion:* During 1st week after delivery before woman leaves hospital[Q]
  - High chance of perforation
  - High chance of expulsion
- *Post-puerperal insertion:* 6 – 8 weeks after delivery[Q]
  - Can be combined with follow-up visit of mother and child
  - Not recommended after 2nd trimester abortion

IUDs as Emergency Contraceptives

I Insertion of a CuT as emergency contraception is *'more than 99% effective'*

- IUDs can be used as emergency contraception to prevent pregnancy *'up to 5 days after'* unprotected sexual intercourse, or sexual intercourse during which the primary contraception is believed to have failed[Q]
- Insertion of a CuT as emergency contraception is *'more than 99% effective' (more effective than emergency contraceptive pills)* [Q]

Grafenberg's Ring

- *Grafenberg's ring:* 1st Generation (Non-medicated/Inert) IUD[Q]
- A flexible ring of *'silver wire'* used as a birth control device
- It was a precursor to the IUD (inserted into the woman's uterus)

Progestasert

I Rate of hormone release: 65 mcg per day

- *Progestasert is a 3rd Generation IUD* (Medicated/Bio-active IUD) [Q]
- Progestasert was the *'first hormonal uterine device'*, developed in 1976
- *T-shaped device filled with 38 mg progesterone*[Q]
- *Reservoir:* Silicon oil (in vertical stem)
- *Rate of hormone release:* 65 mcg per day[Q]
- *Shelf life:* 1 – 1½ years[Q]
- *Mechanism of action:*
  - Direct local effect on uterine lining
  - Effect on cervical mucus
  - Effect on sperms
- *Advantages of Progestasert:*
  - IUD with *'Lowest expulsion rate'*
  - IUD with *'Lowest removal rate'*
  - Lesser chances of dysmenorrhoea and menorrhagia
- *Disadvantages of Progestasert:*
  - Expensive
  - Requires yearly replacement
  - Highest rate of ectopic pregnancy: 9-fold higher
  - Failure rate of Progestasert: 2% per year

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HORMONAL METHODS

Types of Combined OCPs

- *Monophasic OCPs* deliver the same amount of estrogen and progestin every day
- *Biphasic OCPs* deliver the same amount of estrogen every day for the first 21 days of the cycle[Q]
  - first half of the cycle: progestin/estrogen ratio is lower to allow the endometrium to thicken
  - second half of the cycle: progestin/estrogen ratio is higher to allow normal shedding of the lining of the uterus
- *Triphasic OCPs* have constant or changing estrogen concentrations and varying progestin concentrations throughout the cycle

Composition of Combined OCPs

- *Composition of Combined OCP*[Q]*:* (MALA-N)
  - Ethinyl estradiol: 0.03 mg (30 mcg)
  - Norgestrel: 0.15 mg (150 mcg)
- *Composition of 'New Low dose OCP'*[Q]*:* (Brand name: *Femilon/ Elogen*)
  - Ethinyl estradiol: 0.02 mg (20 mcg)
  - Desogestrel: 0.15 mg (150 mcg)

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Composition of Combined OCP[Q]: (MALA-N)
- Ethinyl estradiol: 0.03 mg (30 mcg)
- Norgestrel: 0.15 mg (150 mcg)

Combined OCPs under RCH Program

	MALA – N	MALA – D
Type of contraceptive	Combined OCP	Combined OCP
Estrogen[Q]	Ethinyl estradiol (0.03 mg)	Ethinyl estradiol (0.03 mg)
Progesterone[Q]	Norgestrel (0.15 mg)	Desogestrel (0.15 mg)
Status in RCH[Q]	Provided free of cost	Provided at a subsidized cost (₹ 3/- per packet)

Adverse Effects of Combined Oral Contraceptive Pills (OCPs)[Q]

- *Cardiovascular effects*[Q]*: (due to oestrogenic component)*
  - Myocardial infarction
  - Cerebral thrombosis
  - Venous thrombosis (with or without pulmonary embolus)
  - Hypertension
- *Carcinogenesis:* [Q]
  - Cervical cancer (increased risk)
  - Breast Cancer
- *Metabolic Effects*[Q]*: (due to progesterone component)*
  - Elevated blood pressure (hypertension)
  - Altered lipid profile (reduced HDL)
  - Blood clotting
  - Hyperglycemia and increased plasma insulin
- *Hepatocellular adenoma*[Q]
- *Gallbladder disease*[Q]
- *Cholestatic jaundice*[Q]
- *Monolial vaginitis (candidiasis)* [Q]
- *Decline milk volume during lactation*
- *Slight delay in return of fertility (upon discontinuation)*
- *Depression*
- *Fetal birth defects (?)*
- *General effects:*
  - Breast tenderness
  - Weight gain[Q] (due to water retention)

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- Headache & migraine[Q]
- Bleeding disturbances

Beneficial Effects of Combined Oral Contraceptive Pills (OCPs)[Q]

- *Benign breast disorders (Fibrocystic disease, Fibroadenoma)*
- *Pelvic Inflammatory Disease (PID)*
- *Ectopic pregnancy*
- *Iron deficiency anemia*
- *Benign ovarian disease (Ovarian cysts)*
- *Malignant ovarian disease (Ovarian cancer[Q])*
- *Endometrial cancer[Q]*
  - Combined oral contraceptive use *'reduces the risk of ovarian cancer by 40% and the risk of endometrial cancer by 50%'* compared to never users
  - Risk reduction increases with duration of use (80% reduction in risk for both cancers with use >10 years)
  - Risk reduction for both cancers persists for >20 years
- *Non-contraceptive benefits of combined OCPs:*
  - polycystic ovary syndrome (PCOS)
  - endometriosis
  - adenomyosis
  - anaemia related to menstruation
  - painful menstruation (dysmenorrhea)
  - mild or moderate acne
  - irregular menstrual cycles
  - dysfunctional uterine bleeding

Contraindications for Use of Combined Oral Contraceptive Pills (OCPs)

Absolute contraindications[Q]	Relative contraindications*
1. Breast Cancer 2 Genital Cancer 3. Liver disease 4. History of thromboembolism 5. Cardiac abnormalities 6. Congenital hyperlipidemia 7. Undiagnosed abnormal uterine bleeding 8. Pregnancy	1. Age > 40 years[Q] 2. Smoking and age > 35 years[Q] 3. Mild hypertension 4. Chronic renal disease 5. Epilepsy 6. Migraine 7. Nursing mothers (0 – 6 months) 8. Diabetes mellitus 9. Gall bladder disease 10. History of infrequent bleeding 11. Amenorrhoea

(*require medical surveillance)

Centchroman (Saheli)

I Saheli
Synthetic NON-STEROIDAL oral contraceptive

- *Synthetic NON-STEROIDAL oral contraceptive[Q]*
- *Brand name:* Saheli
- *Chemical in Centchroman:* ORMELOXIFENE[Q]
- *Mechanism of Action:* Selective estrogen receptor modulators (SERMs[Q]) a class of medication which acts on the estrogen receptor
  - Works through a unique combination of weak estrogenic and potent anti-estrogenic properties
- *Developed by:* Central Drug Research Institute (CDRI), Lucknow, India[Q]
- *Dosage & frequency:* 1 tablet (30 mg) twice a week X 3 months, then 1 tablet per week[Q]
- *Failure rate (Pearl Index):* 1.83 – 2.84 per HWY[Q]

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- *Uses of Centchroman:*
  - As a contraceptive
  - Treatment of dysfunctional uterine bleeding
- *Contraindications of Centchroman:*
  - PCOD (Stein Leventhal Syndrome) Q
  - Cervical hyperplasia
  - Recent history of jaundice
  - Severe allergic disease
- *Other features:*
  - Centchroman is also known as *'once-a-week pill'*Q
  - Centchroman is the *'only anti-implantation agent approved for clinical use'* globally
  - Centchroman has also been found effective as an anti-breast cancer agent

DEPOT Formulations (Injectable Hormones^{Q})

- *DMPA (Depot Medroxy Progesterone Acetate):* a Progestogen only Injectable contraceptive (Depot formulation) Q
  - *Dose:* 150 mg i/m every 3 monthsQ
  - *Advantages:*
    - Highly effective
    - Long lasting and reversible
    - Does not affect lactation
  - *Side effects:*
    - Disruptions of normal menstrual cyclesQ
    - Amenorrhoea
- *NET–EN:* Norethisterone Enanthate, a Progestogen only Injectable contraceptive (Depot formulation) Q
  - *Dose:* 200 mg i/m every 2 monthsQ
  - *Advantages:*
    - Highly effective
    - Long lasting and reversible
  - *Side effects:*
    - Disruptions of normal menstrual cyclesQ
    - Amenorrhoea

I Side effects: Disruptions of normal menstrual cycles

I NORPLANT: 6 silastic capsules containing 35 mg LNG each

Norplant

- *NORPLANT:* Subdermal implant contraceptiveQ
  - *6 silastic capsules containing 35 mg LNG each*Q
  - Norplant R2: 2 capsules containing 75 mg LNG each
- *Mechanism of action:* Capsules or rods are inserted beneath skin of forearm; prevents ovulation
- *Effectiveness:* 5 years
- *Disadvantages:*
  - Irregularities of menstrual bleeding (MC)Q
  - Surgical procedures require d for insertion and removal

EMERGENCY METHODS

Emergency Contraception (EC)

- *EC/Emergency postcoital contraception:* Contraceptive measures that, if taken after sex, may prevent pregnancyQ
- *Yuzpe and Lancee Method*Q*:* Combined oral pills are generally accepted as the preparation of choice for post-coital (emergency) contraception, as it is less likely to cause adverse side effects

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- *Regimens*[Q]:
  - *Current recommendation*[Q] *(pills with 30 mcg oestrogen):* 4 pills immediately followed by 4 pills 12 hours later
  - *Standard method (pills with 50 mcg oestrogen):* 2 pills immediately followed by 2 pills 12 hours later
  - *Pills with 200 mcg oestrogen:* 1 pill immediately followed by 1 pill 12 hours later
- Regimens have to be *'completed within 72 hours of coitus'*[Q]
  - The sooner started, the more effective it is and the effectiveness more than 72 hours after sexual intercourse is greatly reduced
- *Method is not guaranteed to prevent pregnancy:*
  - A pregnancy test should be carried out if the period is >3 days late
  - The Regimen does not protect against STDs[Q]
- *Phrase 'morning-after pill' is figurative:* Combined OCPs can be used for up to 72 hours after sexual intercourse
- *MC side effect reported by users of emergency contraceptive pills:* Nausea

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Mini Pills (POP):
Pill has to be *'used within 72 hours of intercourse* (LNG oral tablet (0.75 mg): 1st tablet within 72 hours of intercourse and 2nd tablet after 12 hours of first dose)

- *Mini Pills (POP):* Progesterone only Pill (POP) 0.75 mg[Q]
  - Pill has to be *'used within 72 hours of intercourse* (LNG oral tablet (0.75 mg): 1st tablet within 72 hours of intercourse and 2nd tablet after 12 hours of first dose) [Q]
  - Reduces risk of pregnancy by 89%
  - Use in first 24 hours prevent 95% of expected pregnancies
  - POP as an Emergency Contraceptive has showed greater efficacy with reduced side effects and has therefore superseded Yuzpe & Lancee method (WHO)
- *IUD Insertion:* Must be *'inserted within 5 days of coitus'*[Q]
  - Insertion of IUD is more effective than use of Emergency OCPs[Q]
- *High dose estrogens: Estrogen 5mg OD X 5 days*[Q]
- *Antiprogestogen (Mifepristone RU 486):* 600 mg stat within 72 hours of coitus[Q]

STERILIZATION

New Sterilization Guidelines in India 2013

- *Female sterilization*:
  - Married (or ever-married)
  - 22-49 years of age
  - Atleast one child >1 year age
  - No past history of sterilization of self/ spouse
  - Sound mind
  - For mentally-ill:
    - Certified by Psychiatrist
    - Statement on soundness of mind by legal guardian/ spouse
  - Service:
    - Minilap by Trained MBBS doctor
    - Laparoscopic sterilization by DGO, MD (GynObs) or MS (Surgery)
- *Male sterilization*:
  - Married (or ever-married)
  - <60 years of age
  - Atleast one child >1 year age
  - No past history of sterilization of self/ spouse
  - Sound mind
  - *For mentally-ill*:
    - Certified by Psychiatrist
    - Statement on soundness of mind by legal guardian/ spouse
  - *Service*:
    - Conventional vasectomy by Trained MBBS doctor
    - No-scalpel vasectomy (NSV) by Trained MBBS doctor

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Vasectomy

- *Procedure of Vasectomy:*
  - Remove *'minimum 1 cm of vas deferens'*[Q]
  - Ends are ligated and folded back to themselves
  - Person is NOT sterile UNTIL after 30 ejaculations (3months) post-vasectomy[Q]
  - Open ended Vasectomy:
    - Seals only top end of vas deferens
    - Sperms are free to spill out from the lower severed end of the vas
    - Likelihood of long-term testicular pain from *'backup pressure' seems to be eliminated* using this method
  - *No Scalpel Vasectomy (NSV):* vas is brought out through a tiny puncture which does not require any stitches
    - Also known as '*Key hole vasectomy*'[Q]
    - Surgical hook (not scalpel) is used to enter the scrotum
    - New safer, convenient technique acceptable to males
    - Nearly painless, less invasive and faster
- *Post-operative advice:*
  - Patient need 30 ejaculations after vasectomy, before turning sterile[Q]
  - Use of barriers methods till aspermia
  - Avoid bath for 24 hours after operation[Q]
  - T-bandage for support for 15 days, keep site dry[Q]
  - Avoid cycling, lifting heavy weights for 15 days[Q]
  - Stitch removal on 5th day
- *After-effects of vasectomy*[Q]*:*
  - *Operative*: Pain, scrotal hematoma, local infection
  - *Sperm granules*:
    - 7 mm painful mass
    - appears 10–14 days after vasectomy[Q]
    - can provide a medium for re-anastomosis of vas
    - using metal clips reduce this problem
  - *Spontaneous recanalization*:
    - seen in 0–6 % cases[Q]
    - require regular follow-up for 3 years
  - *Autoimmune response*:
    - seen in 54% of vasectomised persons[Q]
    - require regular follow-up for 3 years[Q]
  - *Psychological*:
    - diminution of sex vigour, impotence,
    - fatigue, headache
  - *Post-Vasectomy Pain Syndrome*: primary long-term complication (permanent feeling)
- *Sterilization is the most cost-effective contraceptive measure*
  - Vasectomy is overall most cost-eefective: Cost wise ratio is 5 vasectomies to 1 tubectomy
- *Failure of vasectomy:*
  - *MCC in India:* Mistaken identification of vas deferens[Q]
  - *Failure rate (Pearl Index):* 0.15 per HWY[Q]
  - *Confirmation of successful vasectomy:*
    - Histological confirmation
    - Smear of squeeze of vas by Wright's stain[Q]

I Failure of vasectomy: *MCC in India:* Mistaken identification of vas deferens

Tubectomy

Refer to Obstetrics & Gynaecology book for Theory

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MISCELLANEOUS (FAMILY PLANNING AND CONTRACEPTION)

Non-contraceptive Benefits of Contraceptives

- *Non-contraceptive benefit of Male Condom and Female condom:* Prevention of HIV and STI transmission[Q]
- *Non-contraceptive benefit of Combined OCP[Q]:*
  - Regularization of irregular menstrual cycles esp. in Stein Levinthal Syndrome (Polycystic Ovarian Disease – PCOD)
  - *Reduced incidence or improvements in*:
    - Dysmenorrhoea
    - Anemia
    - Acne
    - Hirsutism
    - Ectopic pregnancy
    - Benign breast disease
    - Endometrial cancer
    - Ovarian cysts
    - Ovarian cancer
    - Colorectal cancer
    - Pelvic inflammatory disease (PID)
    - Osteopenia, osteoporosis
- *Non-contraceptive benefit of Centchroman:* Treatment of dysfunctional uterine bleeding (DUB) [Q]
- *Non-contraceptive benefit of IUDs[Q]:*
  - Synechiolysis in Asherman's Syndrome[Q]
  - Reduction of risk of Endometrial cancer
  - Treatment of anemia
  - Treatment of menorrhagia (LNG IUD)
  - Hormone replacement therapy – HRT (LNG IUD)
  - Adjuvant therapy to tamoxifen (LNG IUD)

Medical Termination of Pregnancy Act, 1971[Q]

I

Medical Termination of Pregnancy Act, 1971[Q]
Period of gestation must be 'less than 20 weeks'

- *Passed in:* April 1972[Q]
- *Indications for MTP[Q]:*
  - *Humanitarian:* If pregnancy is as a result of rape/ sexual assault
  - *Eugenic:*[Q] Any genetic/ chromosomal anomaly detected in fetus
  - *Therapeutic[Q]:* If carrying out full term pregnancy poses a risk to life of mother
  - *Social:*[Q] If pregnancy is a result of contraceptive failure
- *Written consent of guardians:*
  - If woman is a lunatic[Q]
  - If woman is less than 18 years age[Q]
- *Period of gestation must be 'less than 20 weeks':* [Q]
  - 0 – 12 weeks: Opinion of one doctor is sufficient[Q]
  - 12 – 20 weeks: Opinions of 2 doctors required[Q]
- *Who can perform MTP[Q]:*
  - *Qualification:* MD (Gyn-Obs) or DGO or 6-months Housemanship in Gyn-Obs
  - *Experience:* Atleast carried out 20 – 25 supervised MTPs[Q]
- *Where MTP can be done:* At a place authorised by Government of India

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Newer Contraceptives

- *Essure:* A permanent sterilization procedure for women (USA)
  - *Mechanism of action:*
    - Micro-inserts are placed into fallopian tubes by a catheter passed from vagina through cervix and uterus
    - Once in place, the device is designed to elicit tissue growth (scarring) in & around micro-insert to form over a period of 3 months an occlusion/ blockage in fallopian tubes
    - Tissue barrier formed prevents sperm from reaching an egg
    - Occlusion confirmed by Hysterosalpingogram
    - No general anaesthetic nor incision through the abdomen required
  - *Effectiveness:* 99.80% effective based on 4 years of follow-up
  - *Disadvantages:*
    - Micro-inserts do not prevent the transmission of STIs
    - Ectopic pregnancy
    - Expulsion, perforation of uterus
- *Contraceptive patch: Is a 'transdermal patch'* applied to the skin that releases synthetic estrogen and progestin hormones to prevent pregnancy[Q]
  - Have the same effectiveness as the combined OCPs
  - *Composition:* ethinyl estradiol (an estrogen) and norelgestromin (a progestin)
  - 1 patch is applied for 7 days; 3 such patches are applied succesively, No patch is applied in the 4th week
  - *Mechanism of action:* Prevention of ovulation
- *Combined hormonal contraceptive vaginal ring:*
  - *Composition:* etonogestrel (a progestin) and ethinyl estradiol
  - *Mechanism of action:* Prevention of ovulation
  - Ring is inserted into vagina for a 3 week period, then removal of the ring for 1 week, during which user will experience menstrual period
  - Muscles of the vagina keep ring securely in place, even during exercise or sex
  - *Benefits of the ring include:*
    - Once-a-month self-administered use offering convenience, ease of use and privacy
    - Lower estrogen exposure than with OCPs or patch
    - Low incidence of estrogenic side effects such as nausea and breast tenderness
    - Low incidence of irregular bleeding.

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MULTIPLE CHOICE QUESTIONS

DEMOGRAPHY

DEMOGRAPHIC CYCLE AND PROCESSES

1. **Demographic Gap attains its maximum limit in:** *[AIIMS May 2005]*
   (a) Early Stage I
   (b) Late Stage II
   (c) Late Stage III
   (d) Early Stage IV

2. **True about late expanding phase of demographic cycle:** *[Recent Question 2013] [AIPGME, 2004-09]*
   (a) Birth rate is lower than the death rate
   (b) Death rate begins to decline, while the birth rate remains unchanged
   (c) Death rate declines still further, and the birth rate tends to fall
   (d) High birth rate and high death rate

3. **Contraction of Demographic-Gap starts in:** *[AIIMS Nov 2005, Nov 05]*
   (a) Stage I
   (b) Late Stage II
   (c) Early Stage III
   (d) Stage IV

4. **In which stage of the demographic cycle is India currently?** *[Recent Question 2013] [AIIMS Dec 1997]*
   (a) High stationary *[Karnataka 2004]*
   (b) Late expanding *[MP 2002, MH 2007, RJ 2002]*
   (c) Early stationary
   (d) Low stationary

5. **'Demographic Processes' does not include:** *[AIIMS Sep 1996]*
   (a) Fertility
   (b) Morbidity
   (c) Mortality
   (d) Social mobility

6. **In a demographic cycle low stationary phase corresponds to which stage?** *[DPG 2008]*
   (a) First
   (b) Second
   (c) Third
   (d) Fourth

7. **The fourth stage of the demographic cycle is:** *[Karnataka 2007]*
   (a) Declining
   (b) Early expanding
   (c) High stationary
   (d) Low stationary

8. **Third stage of demography indicates:**
   (a) High birth rate and high death rate
   (b) Death rate begins to decline *[PGI June 2007]*
   (c) While the birth rate remains unchange
   (d) Birth rate tends to fall and death rate declines still further
   (e) Low death rate and low birth rate
   (f) Birth rate lower than death rate

9. **Movement at socio-economic level is:**
   (a) Social equality *[AIPGME 2010]*
   (b) Social mobility *[Recent Question 2013]*
   (c) Socio-economic upliftment
   (d) Social mobilization

10. **Late expanding stage of population in India is due to?** *[AIIMS May 2011]*
    (a) Birth rate stationary death rate continues to fall
    (b) Death rate declines faster than birth rate
    (c) Birth rate declines, death rate same
    (d) Birth rate is less than birth rate

Review Question

11. **Early expanding stage is denoted by:** *[AP 2002]*
    (a) Decreased birth rate and Decreased death rate
    (b) Increased birth rate and Increased death rate
    (c) Decreased birth rate and Increased death rate
    (d) Unchanged birth rate and Decreased death rate

BIRTH RATE, DEATH RATE AND GROWTH RATE

12. **At current growth rate, India's population will double in:** *[AIPGME 1992-1997]*
    (a) 23-28 years
    (b) 28-35 years
    (c) 35-47 years
    (d) 47-70 years

13. **Current annual growth rate of a population can be calculated by:** *[AIIMS Dec 1995]*
    (a) Crude birth rate (CBR) minus Crude death rate (CDR)
    (b) Crude death rate (CDR) minus Crude birth rate (CBR)
    (c) Decadal growth rate/10
    (d) Crude birth rate (CBR) plus Crude death rate (CDR)

14. **Crude birth rate is a simplest measure of fertility because it includes:** *[Karnataka 2006]*
    (a) Total population
    (b) Mid year population
    (c) Live births only
    (d) Pre-term births

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15. **Birth rate is:** *[PGI Dec 05]*
    (a) Live birth/1000 mid year population
    (b) Birth/1000 mid year population
    (c) Live birth/10000 mid year population
    (d) Live birth/10,000 population of reproductive age group (15-45)
    (e) Live birth/1000 population

16. **Which countries have a higher growth rate than India?**
    (a) Myanmar *[PGI June 08]*
    (b) Nepal
    (c) Sri Lanka
    (d) Bangladesh

17. **Crude birth rate – NOT true is:** *[AIIMS May 2010]*
    (a) It is a measure of fertility
    (b) It is actually a ratio not a rate
    (c) It is independent of age of population
    (d) Numerator does not include still births

18. **Population growth is rated to be 'explosive' if the annual growth rate exceeds:** *[Karnataka 2011]*
    (a) 2.0% *[Recent Question 2013]*
    (b) 1.5% *[MH 2007, 2008, UP 2006]*
    (c) 1.0% *[Recent Question 2015]*
    (d) 0.5%

19. **In a community of 5000 people, the crude birth rate is 30 per 1000 people. The number of pregnant females is?** *[Recent Question 2013]*
    (a) 150
    (b) 165
    (c) 175
    (d) 200

20. **What is exponential growth?** *[Recent Question 2013]*
    (a) Rapid growth in population that leads to misbalance in birth and deaths
    (b) Slow growth rate
    (c) Growth limited by limiting factors
    (d) None of the above

Review Questions

21. **If Birth rate – 42 and death rate 31 then annual growth rate:** *[Bihar 2005]*
    (a) 11%
    (b) 1.1%
    (c) 0.25%
    (d) 2.5%

22. **Denominator of crude birth rate is:** *[UP 2000, MP 2000]*
    (a) Mid year population
    (b) Number of living children
    (c) Number of death children
    (d) Total number of crude birth

23. **Denominator in crude death rate is:** *[MP 2000]*
    (a) Mid year population
    (b) Mid year females 15-44 years
    (c) Mid year marital females 14-44 years
    (d) Mid year males 15-44 years

24. **If annual growth rate of population is 1.5–2% the population is likely to get doubled in:** *[MH 2006]*
    (a) 18-20 years
    (b) 20-23 years
    (c) 28-35 years
    (d) 35-47 years

25. **Age pyramid of India is:** *[Recent Question 2012] [MH 2000]*
    (a) Broad at base and narrow at apex
    (b) Broad from base to apex
    (c) Broad at apex and narrow at base
    (d) All

POPULATION PYRAMID

26. **In India women in child-bearing (15 – 44 years) age group constitute ...% of the population:**
    (a) 10 *[AIIMS Dec 1997]*
    (b) 15
    (c) 22
    (d) 35

27. **The carrying capacity of any given population is determined by its:** *[AIIMS May 05]*
    (a) Population growth rate
    (b) Birth rate
    (c) Death rate
    (d) Limiting resource

28. **Reproductive age group in India contributes to total population as about:** *[AIIMS June 1997]*
    (a) 26%
    (b) 37%
    (c) 51%
    (d) 66%

29. **The spindle-shaped Age pyramid denotes?** *[Recent Question 2013]*
    (a) Developing country
    (b) Developed country
    (c) Underdeveloped country
    (d) Middle east country

SEX RATIO AND DEPENDENCY RATIO

30. **According to 2001 census, sex ratio i.e. no. of females per 1000 males is:** *[AIPGME 2006]*
    (a) 940
    (b) 933
    (c) 927
    (d) 104

31. **For a population of 10000, sex ratio of more than 1000 means:** *[AIIMS Nov 2003]*
    (a) Males are less than 500
    (b) Females are less than 500

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(c) Males are less than 5000
(d) Females are less than 5000

32. In calculating Dependency Ratio, the numerator is expressed as: *[Recent Question 2013, AIIMS May 03]*
(a) Population under 10 years and 60 and above
(b) Population under 15 years and 60 and above
(c) Population under 10 years and 65 and above
(d) Population under 15 years and 65 and above

33. Community X has 30% below 15 yrs of age and 10% over 65 years of age. Dependency ratio for community X is:
(a) 20% *[AIIMS May 2002]*
(b) 40% *[Recent Question 2012, 2015]*
(c) 66.6%
(d) 3%

34. Dependency ratio includes: *[PGI June 05]*
(a) 0-5 yrs age
(b) 6-14 yrs age
(c) 15-45 yrs age
(d) > 65 yrs

35. Child sex ratio of India (Census 2011) is:
(a) 927 *[AIPGME 2012]*
(b) 940
(c) 914
(d) 933

36. Potential Support Ratio (PSR) is defined as: *[AP 2014]*
(a) Number of persons aged 15 to 65 per children below 15 years
(b) Number of persons aged 15 to 65 per one older person aged >/= 65 years
(c) Number of person aged 15 to 65 per one older person aged > 65 and younger person < 15 years
(d) Number of persons aged 15 to 65 persons older person aged > 60 and younger person < 15 years

Review Questions

37. Which states in India has the lowest female/male sex ratio is: *[UP 2004]*
(a) Kerala
(b) Haryana
(c) Tamil Nadu
(d) Himanchal Pradesh

38. All are true about sex ratio except: *[MP 2001]*
(a) Kerala is the state where it is not adverse for women
(b) Since 1901 it is unfavourable for women
(c) Since 1901 there is steadily decreasing trend
(d) It is determined by sex composition of population affected by differentials in mortality conditions of male and females, sex selective migration and sex ratio at birth

39. Denominator age group for calculation of dependency ratio is: *[MP 2009]*
(a) 0-5 years
(b) 5-15 years
(c) 15-65 years
(d) 65 years and above

LITERACY AND LIFE EXPECTANCY

40. The denominator used for calculating literacy rate of Indian population (Census 2001) is: *[DPG 2005]*
(a) Total mid-year population *[AIIMS Nov 2003]*
(b) Population age 7 years or more
(c) School going population
(d) Population age 18 years or more

41. Literacy rate for India, as per 2001 census, is:
(a) 43.5 % *[AIIMS Nov 04]*
(b) 52.2 %
(c) 65.4 %
(d) 76.4 %

42. Effective literacy rate is calculated from: *[AIIMS PGMEE November 2013]*
(a) Those above age of 7 years
(b) Those who have completed 10 year schooling
(c) Those who have completed 15 year schooling
(d) Total population

FERTILITY

43. True about 'total fertility rate' is: *[AIPGME 02, 08, AIIMS Dec 1997]*
(a) Sensitive indicator of family planning achievement
(b) Completed family size
(c) Number of live births per 1000 married women in reproductive age group
(d) Average number of girls born to a woman

44. If the total fertility rate in India is 2.2, the crude birth rate would be: *[AIPGME 1996]*
(a) 18.6 per 1000 population
(b) 19.2 per 1000 population
(c) 22.4 per 1000 population
(d) 26.2 per 1000 population

45. Which of the following is the national level system that provides annual national as well as state level reliable estimates of fertility and mortality?
(a) Civil registration system
(b) Census *[AIIMS Nov 96, 03, AIIMS May 05]*
(c) Ad-hoc survey
(d) Sample registration system

46. The number of live birth per 1000 women in the reproductive age group in a year refers to:
(a) Total fertility rate *[AIIMS Nov 03, Dec 1997]*
(b) Gross Reproduction Rate
(c) Net Reproduction Rate *[Recent Question 2012, 2014]*
(d) General Fertility Rate

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47. If TFR in a population is 4 per woman, the GRR approx. would be: *[AIIMS Dec 1991, RJ 2006]*
(a) 2
(b) 4
(c) 8
(d) 16

48. Approximate magnitude of completed family size is denoted by: *[UP 2001, Karnataka 2007, 2009]*
(a) Total fertility rate *[MH 2008, PGMCET 2015]*
(b) Total marital fertility rate
(c) General fertility rate
(d) General marital fertility rate

49. Total fertility rate: *[PGI Dec 2K]*
(a) Total no. of children born to a woman in a given yr
(b) Measure of completed family size
(c) Sum of fertility of all age
(d) No of female child born to mother
(e) Total no of child born to mother

50. Population growth is said to be less than adequate requirement when NRR is: *[PGI June 03]*
(a) < 1
(b) = 1
(c) > 1
(d) = 0

51. Which of the following indicators involve reproductive woman: *[PGI June 04]*
(a) Birth Rate
(b) G.F.R.
(c) T.F.R
(d) Maternal mortality rate

52. The denominator in general fertility rate is:
(a) Live births *[UP 2000, DNB 2002, 2005, PGI June 04]*
(b) Mid year population
(c) Reproductive women in the age group 15-45 Mid year population
(d) Married women in the age group 15-45

53. Demographers are of the view that the demographic goal of NRR = 1 can be achieved only if the couple protection rate exceeds: *[Karnataka 2011]*
(a) 40% *[DNB 2011, MH 2008]*
(b) 50%
(c) 60%
(d) 70%

54. General fertility rate is: *[Recent Question 2013]*
(a) Indicator of complete family size
(b) Measure of fertility
(c) Not better than crude birth rate
(d) All of the abover

55. Which of the following includes mortality rate in it? *[PGI 1998, UP 2004, Recent Question 2012]*
(a) TFR
(b) GFR
(c) NRR
(d) GRR

56. Children borne by female at the end of reproductive period is: *[Recent Question 2013]*
(a) TFR
(b) NRR
(c) CBR
(d) GFR

57. What is net reproduction rate? *[Recent Question 2013, 2015]*
(a) No. of children a newborn girl has in her left time
(b) No. of female children a newborn girl has in her life time
(c) No. of male children a newborn girl has in her life time
(d) No. of female children a newborn girl has in her life time taking into account mortality

58. Average number of girls that would be born to a woman if she experiences the current fertility pattern throughout her reproductive span assuming no mortality' is known as *[PGMCET 2015]*
(a) General Fertility Rate
(b) Total Fertility Rate
(c) Gross Reproduction Rate
(d) Net Reproduction Rate

Review Questions

59. General fertility rate: *[Recent Question 2013, Bihar 2003, UP 2004]*
(a) It is the number of live births per 1000 women in the reproductive age group in a given year
(b) It is a better measure of fertility than crude birth rate
(c) The major weakness of this rate is that not all women in the denominator are exposed to the risk of child birth
(d) All of the above

60. Best indicator of fertility: *[Kolkata 2003]*
(a) CBR
(b) TFR
(c) NRR
(d) GRR

MISCELLANEOUS (DEMOGRAPHY)

61. Births in India must be registered within:
(a) 7 days *[AIPGME 1994]*
(b) 14 days
(c) 21 days
(d) 1 month

62. A community has a population of 10,000 and a birth rate of 36 per 1000. 5 maternal deaths were reported in the current year. The MMR is: *[AIPGME 01]*
(a) 14.5
(b) 13.8
(c) 20
(d) 5

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63. Census population count is in reference to: *[AIIMS Nov 2005]*
(a) 1st March
(b) 1st July
(c) 30th June
(d) 1st January

64. Percentage of people below poverty line in India: *[AIIMS May 05]*
(a) 14%
(b) 22%
(c) 29%
(d) 72%

65. National Family Health Survey has successfully completed: *[AIIMS May 05]*
(a) One rounds
(b) Two rounds
(c) Three rounds
(d) Four rounds

66. The age and sex structure of a population may be described by a: *[AIIMS Nov 03, AIIMS May 05]*
(a) Life table
(b) Correlation coefficient
(c) Population pyramid
(d) Bar chart

67. In a town of 36,000 people, there are 1200 live births, and 60 infant deaths. What is the IMR? *[AIIMS May 2001]*
(a) 50
(b) 25
(c) 10
(d) 5

68. What is the best determinant of the health status of a country? *[AIIMS May 94, 2001]*
(a) CPR
(b) IMR
(c) MMR
(d) CDR

69. By 2015, Indian city likely to join group of Mega cities (Delhi, Mumbai, Kolkata) is: *[AIPGME 2002]*
(a) Chennai
(b) Ahmedabad
(c) Hyderabad
(d) Pune

70. WHO defines adolescent age between:
(a) 10-19 years of age *[AIPGME 2005]*
(b) 10-14 years of age *[PGI November 2014]*
(c) 10-25 years of age
(d) 9-14 years of age

71. Census is conducted in every _____ years in India: *[Karnataka 2006]*
(a) 25
(b) 15
(c) 10
(d) 20

72. NFHS-3 was carried out in: *[Recent Question 2013]*
(a) 1995
(b) 2000
(c) 2005
(d) 2010

73. National family health survey is done every…….. *[DNB December 2010]*
(a) 6 months
(b) 1 year
(c) 5 years
(d) 10 years

74. First disability census was done in the year: *[DNB June 2011]*
(a) 1881
(b) 1951
(c) 1981
(d) 2001

75. Which is/are true for Kerala in relation to India? *[PGI May 2012]*
(a) High literacy rate
(b) High Doctor: Population ratio
(c) High growth rate
(d) Older age of marriage
(e) Higher Life expectancy

76. Second National Family Health Survey was done in the year: *[DNB June 2009]*
(a) 1992-93
(b) 1998-99
(c) 2005-2006
(d) 2008-2009

77. Sample registration system done for both death and birth enumeration at every: *[DNB December 2011]* *[AP 2004]*
(a) 6 months
(b) 1 year
(c) 5 years
(d) 10 years

78. BIRADS is: *[AIIMS November 2012]*
(a) Breast Imaging Reporting and Data System
(b) Best Imaging Reporting and Data System
(c) Brain Imaging Reporting and data system
(d) Biopsy Imaging reporting and data system

79. First census in India was done in? *[Recent Question 2013]*
(a) 1861
(b) 1871
(c) 1881
(d) 1891

80. True about Census of India is/are: *[PGI May 2014]*
(a) Total population doubled from 1921 to 1971
(b) Annual average growth rate 1.64% in 2011 census
(c) Decadal growth rate has always been positive
(d) Total population above 500 million in 1961
(e) Decadal growth rate 17.64% in 2011

81. True regarding Census of India is/are:
(a) Done by Ministry of Home Affairs
(b) Done every 5 years *[PGI November 2014]*

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(c) Census Commissioner is the supreme head
(d) First started in 1851
(e) Done at Mid-year

82. A child is born to an Indian couple outside India. Birth registration must be done: *[Recent Question 2014]*
(a) Within 21 days
(b) Within 21 days of arrival into India
(c) Within 60 days
(d) Within 60 days of arrival into India

83. State used as Yardstick-of-health in India is *[Recent Question 2015]*
(a) Tamil Nadu
(b) Kerala
(c) Andhra Pradesh
(d) Gujarat

Review Questions

84. Sex and age is presented by: *[DNB 2001]*
(a) Pyramid
(b) Bar diagram
(c) Both
(d) None

85. All are true regarding Sample Registration System (SRS) *except*: *[UP 2005]*
(a) Initiated in the 1960
(b) Estimates of birth and death rates
(c) Dual-record system
(d) Survey should be done every year

86. Which of the following year in the history of demography of India is India is known as the year of big divide: *[Recent Question 2012] [MP 2002] [Recent Question 2014]*
(a) 1881
(b) 1921
(c) 1947
(d) 1978

87. Birth and death registration should be done within how many days? *[MH 2000]*
(a) 14 and 7 respectively
(b) 7 and 14 respectively
(c) 7 and 21 respectively
(d) 14 and 21 respictively

88. The system of collection of data to give national and subnational estimate of vital indicators consist of continuous enumeration backed by 6 months survey is:
(a) Model registration survey *[MH 2003]*
(b) National sample survey
(c) Sample registration survey
(d) National family health survey

89. Which of the following is best to compare the vital statistics of countries? *[MH-PGM-CET 2007, MH 2008]*
(a) Crude death and birth rates
(b) Age standardized death rate
(c) Proportional mortality rate
(d) Age specific death rate

90. Which one of the following is a DUAL RECORD SYSTEM consisting of continuous enumeration of birth and death by numerator and which indicates survey every six months? *[MH 2008]*
(a) Sample registration system
(b) Civil registration system
(c) Census
(d) Model registration system

FAMILY PLANNING AND CONTRACEPTION

CONCEPTS OF FAMILY PLANNING

91. A contraceptive 'Z' is used by 100 couples for a continuous period of 2 years. During this period 20 women become pregnant despite using the contraceptive 'Z'. What is the Pearl Index of 'Z'? *[AIPGME 1993]*
(a) 0.1 per HWY
(b) 5 per HWY
(c) 10 per HWY
(d) 1000 per HWY

92. Contraceptive efficacy is measured by:
(a) Pearl Index only *[AIIMS Dec 1995, Nov 2008]*
(b) Pearl Index and Life table analysis
(c) Life table analysis and Couple protection rate
(d) Pearl Index and Couple protection rate

93. Eligible couples per 1000 population in India is:
(a) 50 – 70 *[AIPGME 2002]*
(b) 100 – 120
(c) 150 – 180
(d) 200 – 250

94. In a village with 180 eligible couples, Family Planning data of contraceptive methods is:
- Sterilization: Vasectomy - 3 and Tubectomy - 8
- IUD users - 10
- Orals pills users - 10
- Condom users - 29

Effective CPR in the village is: *[AIPGME 2004]*
(a) 60%
(b) 33%
(c) 25%
(d) 10%

95. Scope of Modern Concept of family planning services include all of the following except: *[AIPGME 03]*
(a) Screening for cervical cancer *[AIIMS Nov 2001]*
(b) Providing services for unmarried mothers
(c) Screening for HIV infection
(d) Providing adoption services

96. Which of the following is important in calculation of pearl index:
(a) Number of abortions
(b) Total accidental pregnancy
(c) Socioeconomic status
(d) Total gestational period

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97. **Pearl Index is:** *[Recent Question 2013, DNB December 2011, UP 2006]*
(a) Failures per 1000 women-years of exposure
(b) Failures per 100 women-years of exposure
(c) Failures per 10 women-years of exposure
(d) Failures per women-years of exposure

98. **Pearl index is defined as:** *[Recent Question 2012]*
(a) Accidental pregnancies per 1000 women-years of exposure
(b) Accidental pregnancies per 100 women-years of exposure
(c) Accidental pregnancies per 10 women-years of exposure
(d) Accidental pregnancies per women-years of exposure

Review Questions

99. **All parameters are used by epidemiologist in evaluation of the efficacy of acceptance of family planning method *except*:** *[DNB 2002]*
(a) Annual general marriage rate
(b) Spacing between first and second child
(c) Annual birth rate
(d) Number of children born

100. **100 women, followed up for 20 months, with OCPs, 5 became pregnant. Calculate the Pearl Index:**
(a) 1 *[Bihar 2003]*
(b) 2
(c) 3
(d) 4

101. **"Pearl Index" Is normally used for studying the:**
(a) Effectiveness of a contraceptive *[TN 2003]*
(b) Unmet need for family planning
(c) Prevention of undesired pregnancies and of STD in young people
(d) Basis of women's response to survey questions

102. **Population control can be achieved by:**
(a) By spacing between the pregnancies
(b) By promoting infanticide *[MP 2002]*
(c) By prohibiting infanticide
(d) Securing maximum involvement of non-governmental agencies

103. **Pearl index is used to evaluate:** *[MP 2005]*
(a) Family planning
(b) Contraceptive acceptance
(c) Population control
(d) Contraceptive failures

104. **The couple protection rate (CPR) to bring within normal range in India, which of the following contraceptive measure is used?** *[MH 2005]*
(a) Sterilization
(b) IUCD
(c) Condom
(d) All of the above

NATURAL METHODS

105. **Natural Family Planning does not include:**
(a) Terminal methods *[AIPGME 1994]*
(b) Basal Body Temperature Method
(c) Cervical Mucus Method
(d) Symptothermic Method

Review Questions

106. **Which of the following Natural method of contraception is most effective?** *[MPSC2006; MH 2008]*
(a) Calendar method
(b) Billing method
(c) Symptothermic method
(d) Basal body temperature method

BARRIER METHODS

107. **Match the contraceptive and its type**

Contraceptive	Type of contraceptive
A. Vaginal Sponge	I. Subdermal implant
B. Norplant	II. Barrier Method
C. NET–EN	III. IUD
D. Grafenberg's Ring	IV. Depot formulation

(a) A - IV, B - II, C - III, D - I *[AIIMS Dec 1995]*
(b) A - II, B - I, C - IV, D – III
(c) A - II, B - IV, C - I, D - III
(d) A - III, B - II, C - I, D – IV

108. **Barrier methods are all except:** *[UP 2006]*
(a) Diaphragm
(b) Foam tablets
(c) Vaginal-sponge
(d) Lippes loop

109. **TODAY, failure rate is:** *[Recent Question 2012, 2013]*
(a) 0-5/100 woman years
(b) 5-10/100 women years
(c) 9-20/100 women years
(d) 0-1/100 woman years

Review Question

110. **'Today' – a contraceptive contains:** *[DNB 2003, 2004]*
(a) Prestaglandin F_2
(b) Norethisterone
(c) 9-Nonoxynol
(d) Cu releasing mesh

IUDS

111. **In Cu-T 380 A, 380 represents:** *[AIGPME 1997, PGI 2006]*
(a) No. of turns of copper wire
(b) Surface area of Cu-T in sq. mm

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(c) Surface area of copper in sq. mm
(d) Effective Life of Cu-T in quarters

112. The most common side effect of IUD insertion is: *[AIPGME 2005]*
(a) Bleeding
(b) Pain
(c) Pelvic infection
(d) Ectopic pregnancy

113. All are true about Progestasert *except*: *[AIPGME 2004]*
(a) Progestasert releases 65 mcg progesterone per day
(b) Progestasert contains 38 mg progesterone
(c) Progestasert is implanted subdermally
(d) Progestasert is a T-shaped device

114. The most common side effect of IUD insertion, which requires its removal is: *[AIIMS Nov 1992, 1996]* *[AIIMS Sep 1997]*
(a) Bleeding
(b) Pain
(c) Pelvic infection
(d) Ectopic pregnancy

115. Characteristics of an ideal candidate for copper–T insertion include all of the following *except*: *[AIIMS Nov 2005, Nov 02]*
(a) Has borne at least one child
(b) Is willing to check IUD tail
(c) Has a history of ectopic pregnancy
(d) Has normal menstrual periods

116. The following statements are true about Intrauterine devices (IUD) *except*: *[AIIMS May 07]*
(a) Multiload Cu-375 is a third generation IUD
(b) The pregnancy rate of Lippes loop and Cu- T 200 are similar *[AIPGME 2004]*
(c) IUD can be used for Emergency Contraception within 5 days
(d) Levonorgestrel releasing IUD has an effective life of 10 years

117. Copper – T is preferably inserted postnatal, after:
(a) 2 weeks *[Karnataka 2005]*
(b) 4 weeks
(c) 5 weeks
(d) 8 weeks

118. Which of the following IUDs do not require to be changed every 3-5 years? *[AIPGME 2012]*
(a) CuT 220 B
(b) CuT ML-375
(c) CuT 380 A
(d) CuT ML-250

119. Cu T 380A IUD should be replaced once in: *[DNB 2008] [DNB June 2010]*
(a) 4 yrs *[Recent Question 2013, UPSC CMS 2015]*
(b) 6 yrs
(c) 8 yrs
(d) 10 yrs

120. Non-medicated Intra Devices (IUDs) are called as:
(a) 3rd generation IUDs *[AP 2014]*
(b) 2nd generation IUDs
(c) 1st generation IUDs
(d) Multi – load devices

121. IUD 'Mirena' release Levonorgestrel for ……. years: *[Recent Question 2014]*
(a) 3
(b) 5
(c) 7
(d) 10

122. Mechanism of action of IUD is: *[CGPG 2015]*
(a) Prevent fertilization
(b) Prevention ovulation
(c) Prevent implantation
(d) Spermicidal

123. Third generation IUCD is: *[Recent Question 2015]*
(a) ML CuT 250
(b) MIRENA
(c) CuT 380 A
(d) Copper -7

Review Questions

124. Nova T has: *[Bihar 2003]*
(a) Silver core
(b) Platinum core
(c) Copper core
(d) Iron core

125. Radioopaque material in copper-T: *[Bihar 2006]*
(a) Silicon
(b) Barium sulphate
(c) Carbon
(d) None

126. True statements of Nova-T: *[Kerala 2003, UP 2004]*
(a) Effective for 10 years
(b) Silver core
(c) More copper content
(d) More chances of perforation

127. All of the following are the advantages of 3rd generation IUD's *except*: *[AP 2007]*
(a) High efficacy
(b) Low expulsion rates
(c) Long acting
(d) Low risk of ectopic pregnancy

128. Third generation IUCD acts by: *[MP 2003]*
(a) Strong anti-fertility effect of metallic copper
(b) By altering the composition of cervical mucous
(c) Hormonal effect on mucosa of endometrium
(d) Enhanced cellular response on endometrium

129. Absolute contraindication of IUCD is: *[RJ 2001]*
(a) Anemia
(b) Diabetes
(c) PID
(d) Hemorrhage

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130. Multi load device refers to: *[RJ 2008]*
(a) First generation IUCD
(b) Second generation IUCD
(c) Oral contraceptive pills
(d) Barrier contraceptives

131. Most effective Cu-T is: *[RJ 2008]*
(a) Cu-T 380 A
(b) Cu- T 220
(c). Cu-T 200
(d) ML-Cu 250

HORMONAL METHODS

132. All are true about Centchroman *except*: *[AIIMS June 1997]*
(a) Centchroman is a non-steroidal contraceptive
(b) Centchroman has been developed in India
(c) Centchroman is useful for females with PCOD
(d) Failure rate of Centchroman is 1.83–2.84 per HWY

133. Consider the following sentence:
Use of oral contraceptive pills confers additional protection against *[AIIMS Nov 2005]*
I. Fibroadenoma
II. Ectopic pregnancy
III. Ovarian cysts and iron deficiency anemia
Which of these statements are correct?
(a) I and II
(b) I and III
(c) II and III
(d) I, II and III

134. If a women was taking oral contraceptive pill, then which of the following investigation would be related to the long term consumption of steroidal contraceptives? *[AIIMS Nov 2002]*
1. Liver functions test
2. Cervical pap smear
3. Wet smear of vaginal secretions for monilial
4. Endometrial biopsy
(a) 2, 3 and 4
(b) 1, 3 and 4
(c) 1, 2 and 4
(d) 1, 2 and 3

135. Besides pregnancy the oral contraceptive protect against all *except*: *[AIPGME 1995]*
(a) Fibroadenoma breast
(b) Iron deficiency anemia
(c) Ovarian cancer
(d) Hepatocellular adenoma

136. How much ethinyl estradiol does the new low dose oral contraceptive pill contain (IN MICROGRAMS)?
(a) 20 *[AIPGME 2005]*
(b) 25
(c) 30
(d) 35

137. Which one of the following is NOT an absolute contraindication for oral contraceptive pills?
(a) Nursing mothers *[AIPGME 2008]*
(b) Cancer of breasts
(c) Cardiac abnormalities
(d) History of thromboembolism

138. Mala – N oral contraceptive pill differs from Mala–D, in terms of: *[Karnataka 2005]*
(a) Norgestrol dosage
(b) Oestradiol dosage
(c) Sold under social marketing scheme
(d) Supplied free of cost

139. Contraindication of O.C.P.: *[PGI June 04]*
(a) Liver disease
(b) PID
(c) Renal disease
(d) Epilepsy (A, C, D)

140. Contraceptive to be avoided in epilepsy is:
(a) Combined OCPs
(b) Condoms
(c) IUDs
(d) Post-coital (emergency) pills

141. Non contraceptive benefits of combined oral pills is/ are reduction of: *[PGI November 2011]*
(a) Iron deficiency anaemia
(b) Breast cancer
(c) Ovarian cancer
(d) PID
(e) Ovarian cysts

142. Minipill is contraceptive of choice for: *[NUPGET 2013]*
(a) Elderly females
(b) Lactating females
(c) Obese women
(d) Menstruating women

143. Which of the following is/are benefits of combined OCPs use? *[PGI November 2013]*
(a) Hepatocellular adenoma
(b) PID
(c) Ovarian cysts
(d) Fibrocystic disease of breast
(e) Ectopic pregnancy

144. A woman using combined oral contraceptive has the following non-contraceptive benefits *except*: *[UPSC CMS 2015]*
(a) Protection against PID
(b) Prevention of colorectal malignancy
(c) Protection against ovarian cancer
(d) Protection against cervical cancer

Review Questions

145. Oral contraceptive cause:
(a) Monilial vaginitis *[DNB 2001]*
(b) Pituitary adenoma

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(c) Ca uterus
(d) Ovarian cysts

146. A depot contraceptive DMPA is to be given every: *[DNB 2004]*
(a) 1 month
(b) 2 months
(c) 3 months
(d) 6 months

147. Non-contraceptive effect of oral contraceptive pills is all *except*: *[UP 2001]*
(a) Protection against benign breast disease
(b) Prevention of ectopic pregnancy
(c) Dysmenorrhoea protection
(d) Iron-deficiency anemia

148. Serious complication of oral contraceptive is: *[UP 2006]*
(a) Leg vein thrombosis
(b) Headache
(c) Break through bleeding
(d) Breast tenderness

149. A health worker who distributes O.C pills — checks all of the following *except*: *[AP 2001]*
(a) Headache
(b) Weight gain
(c) Breast tenderness
(d) Pervaginal bleeding

150. All are non-contraceptive advantages of oral contraceptive pills except: *[AP 2004]*
(a) Pelvic inflammatory disease
(b) Hepatic adenoma
(c) Benign breast cancer
(d) Anemia

151. The side effects like irregular bleeding, depression are associated with use of: *[AP 2005]*
(a) Mini pill
(b) OC pills
(c) Mifepristone
(d) None

152. The dose of ethinyl estradiol in Mala-N is: *[MP 2006]*
(a) 20 µgm
(b) 30 µgm
(c) 50 µgm
(d) 100 µgm

153. The absolute contraindication for prescribing normal contraceptive pills in a woman of reproductive age group is: *[MP 2008]*
(a) Epilepsy
(b) Diabetes mellitus
(c) Milk hypertension
(d) Congenital hyperlipidemia

154. Mala-N-contains NORGESTREL: *[RJ 2005]*
(a) 0.15 mg
(b) 2 mg
(c) 5 mg
(d) 10 mg

155. Minipills contain: *[RJ 2006]*
(a) Only progesterone is small quantity
(b) Progesterone and estrogen
(c) Estrogen in small quantity and progesterone in large
(d) Estrogen

156. DMPA is an injectable contraceptive given every:
(a) Three weeks *[RJ 2007]*
(b) Two months
(c) Three months
(d) Two years

EMERGENCY METHODS

157. All of the following can be used as emergency contraceptive measures except: *[AIIMS Nov 1992]*
(a) Female condoms
(b) IUD
(c) Minipill
(d) Yuzpe and Lancee

158. Yuzpe and Lancee Method is used for: *[AIIMS May 1992]*
(a) Sterilization with 'No Scalpel Technique'
(b) Emergency contraception with OCPs
(c) Emergency contraception with IUDs
(d) Evaluation of newer contraceptives

159. Which of the following is not used as an emergency contraceptive?
(a) LNG- Intrauterine device
(b) Oral LNG
(c) CuT-Intrauterine device
(d) Oral Mifepristone

160. Yuzpee and Lancee regimen must be administered within maximum *[Recent Question 2015]*
(a) 3 hours
(b) 12 hours
(c) 24 hours
(d) 72 hours

161. What is used as emergency contraceptive?
(a) MALA-N *[Recent Question 2015]*
(b) 0.75 mg LNG
(c) Copper T
(d) All of the above

162. What is the Drug of choice for Emergency contraception?
(a) Yuzpe regimen (combined oral pill) *[ESI IMO 2014]*
(b) High dose oestrogen alone
(c) Levonorgestrel only pill
(d) Danazol

Review Question

163. Post coital contraceptives are all *except*: *[MP 2000]*
(a) Norgestrel
(b) OCPs

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(c) RU-486
(d) Copper-T

STERILIZATION

164. Following vasectomy for family planning. A patient should be advised to use some other method of contraception, till: *[RJ 2007]*
(a) Removal of all sutures
(b) Pain completely sutures
(c) Two weeks
(d) Eight weeks

165. A case of vasectomy is said to have failed as the vasectomised person's wife gives birth to a child ten months after the operation. Which one of the following is the most probable cause? *[DPG 2011]*
(a) Failure of the husband to use condom after vasectomy
(b) Surgical failure
(c) Recanalisation
(d) Wife had extramarital contact

166. Most common method of sterilization practiced in India: *[Recent Question 2013]*
(a) Female sterilization
(b) Male sterilization
(c) Both equally common
(d) None

167. Failure rate of Pomeroy's technique of sterilization?
(a) 0.1-0.5% *[Recent Question 2014]*
(b) 0.5-1.0%
(c) 1-2%
(d) 5-10%

168. Ideal time to perform post partum sterilization as per Government of India guidelines is *[UPSC CMS 2015]*
(a) From 12 hours to 7 days of delivery
(b) From 24 hours to 7 days of delivery
(c) From 48 hours to 7 days of delivery
(d) Within 7 days of delivery

MISCELLANEOUS (FAMILY PLANNING AND CONTRACEPTION)

169. Which of the following statements is incorrect? *[AIIMS May 1992]*
(a) IUDs predispose to PID and Actinomycosis
(b) OCPs protect against Candidiasis
(c) Condoms are protective against PID
(d) Female condoms protect against STDs and HIV

170. Increased incidence of ectopic is associated with all *except*: *[AIPGME 1995]*
(a) IUD
(b) Combined oral pills
(c) Menstrual regulation
(d) Safe period method

171. Most cost effective family planning method is:
(a) Vasectomy *[AIPGME 1997]*
(b) Tubectomy
(c) Copper T
(d) Oral pills

172. Conventional Contraceptives are those which:
(a) Were discovered before 1960 *[AIPGME 1996]*
(b) Require action after intercourse
(c) Require action at time of intercourse
(d) Require action before intercourse

173. All are Socio-demographic Goals of National Population Policy *except*: *[AIIMS Nov 2004]*
(a) Achieve 100 % institutional deliveries
(b) Reduce MMR to < 100 per Lac LBs
(c) Achieve 100 % registration of births, deaths, marriages and pregnancies
(d) Prevent and control communicable diseases

174. The National Population Policy of India has set the following goals *except*: *[AIIMS Nov 2008]*
(a) To bring down Total Fertility Rate (TFR) to replacement levels by 2015
(b) To reduce the Infant Mortality Rate to 30 per 1000 live births
(c) To reduce the Maternal Mortality Rate to 100 per 100,000 live births
(d) 100 percent registration of births, deaths, marriages and pregnancies

175. Conventional contraceptive includes one of the following: *[AIIMS May 1994]*
(a) Condom
(b) Copper- T
(c) Oral pills
(d) Tubectomy

176. The Medical Termination of Pregnancy Act does not protect act of termination of pregnancies after:
(a) 20 weeks *[Karnataka 2005]*
(b) 24 weeks *[Recent Question 2014]*
(c) 28 weeks
(d) 30 weeks

177. Best contraceptive for a newly married healthy couple:
(a) Barrier method *[AIIMS May 2009]*
(b) IUCD *[Recent Question 2013]*
(c) Oral contraceptive pills *[UPSC CMS 2015]*
(d) Natural methods

178. Regular reporting of health statistics is done for:
(a) To evaluate trends of a disease *[AIPGME 2012]*
(b) To appreciate health personnel's efforts
(c) For epidemiological research
(d) All of the above

179. Which of the fertility rates have Mid-year population as denominator? *[PGI November 2011]*
(a) Crude birth rate
(b) General fertility rate

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(c) General marital fertility rate
(d) Age-specific fertility rate
(e) Age-specific marital fertility rate

180. Ideal Contraceptive for lactating women: *[AIIMS May 2011]*
(a) POP
(b) IUCD
(c) Lactation amenorrhoea
(d) Barrier methods

181. Ideal contraceptive for a couple who are living separately in two cities and meets only occasionally: *[AIIMS May 2011]*
(a) Barrier methods
(b) OCP's
(c) IUCD
(d) Inj. DMPA

182. Ideal contraceptive for a newly married couple is: *[AIIMS May 2011]*
(a) OCP
(b) Barrier method
(c) IUCD
(d) Natural methods

183. Under Medical Termination of Pregnancy Act (MTP) Act 1971 of India, permission for MTP has to be given by: *[AIPGME 2012]*
(a) Wife only
(b) Husband only
(c) Both wife and husband
(d) Guardian

184. Tubal block constitutes what proportion of female infertility? *[Recent Question 2014]*
(a) 5-7%
(b) 15-20%
(c) 30-35%
(d) 90-05%

185. Family planning services were voluntary in India from: *[Recent Question 2014]*
(a) 1956
(b) 1977
(c) 1992
(d) 1997

Review Questions

186. The contraceptive method of choice (temporary) for 37 years old well educated woman for 37 years old well educated woman: *[DNB 2002]*
(a) Mala-N
(b) Mala-D
(c) I.U.D.
(d) Diaphragm

187. Spermicide used in the contraceptive today: *[DNB 2006]*
(a) Norethinsosterol
(b) Nonoxynol
(c) DMPA
(d) NET-EN

188. True regarding MTP act is: *[TN 2000]*
(a) MTP act was passed in 1971
(b) MTP act has brought down the incidence of illegal abortions
(c) In an emergency, pregnancy can be terminated by a single doctor even after 20 weeks without consulting a second doctor
(d) MTP can be done after 20 weeks of gestation, if the two doctors agree together

189. Most cost effective contraceptive is: *[RJ 2008]*
(a) Vasectomy
(b) Tubectomy
(c) Cu-T
(d) OCP

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EXPLANATIONS

DEMOGRAPHY

DEMOGRAPHIC CYCLE AND PROCESSES

1. **Ans. (b) Late Stage II** *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p156 and K Park 23/e p479]*

DEMOGRAPHIC CYCLE

- *Demographic cycle is closely related to*: Socio-economic progress of a country
- There are *5 stages* (*phases*) *of demographic cycle* through which a nation passes

Demographic cycle		Parameters	
Stages	*Phases*	*CBR*	*CDR*
Stage I	*High stationary*	High	High
Stage II	*Early expanding*	High	Starts declining
Stage III	*Late expanding*	Starts declining	Continue declining
Stage IV	*Low stationary*	Low	Low
Stage V	*Declining*	CDR > CBR	

- *Demographic cycle is based on*: Demographic gap:
  - *DG* = Crude Birth Rate (CBR) – Crude Death Rate
  - *DG starts increasing*: Early Stage II (early expanding phase)
  - *DG is Maximum*: Late Stage II (early expanding phase)
  - *DG starts declining*: Early Stage III (late expanding phase)
  - *DG is Negative*: Stage V (Declining phase)
  - *DG is Narrow*: Stage I (high stationary); Stage IV (low stationary)

Also Remember

- *India is in Stage III* (*Late Expanding Phase*) *of Demographic cycle*
- *Stage V* (*Decline Phase*): Germany, Italy, Spain, Portugal, Greece, United Kingdom and Japan (populations are reproducing well < replacement levels)

2. **Ans. (c) Death rate declines still further, and tshe birth rate tends to fall** *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p156 and Park 23/e p479]*

3. **Ans. (c) Early Stage III** *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p156 and Park 23/e p479]*

4. **Ans. (b) Late expanding** *[Ref. Park 23/e p479]*

5. **Ans. (b) Morbidity** *[Ref. Park 23/e p479]*

- *Demographic Processes*: 5 processes continuously on work in a population, thus determining its' size, composition and distribution
  - Fertility
  - Marriage
  - Mortality
  - Migration
  - Social mobility

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Also Remember

IMPORTANT DEFINITIONS IN DEMOGRAPHY:

- *Crude birth rate (CBR):* Annual number of live births per 1000mid year population
- *General fertility rate (GFR):* Annual number of live births per 1000 women of childbearing age (15–49 years old, or 15–44 years old) mid-year population
- *General marital fertility rate (GMFR):* Annual number of live births per 1000 married women of childbearing age (15–49 years old, or 15–44 years old) mid-year population
- *Age-specific fertility rates (ASFR):* Annual number of live births per 1000 women in particular age groups (usually age 15–19 years, 20–24 years etc)
- *Crude death rate (CDR):* Annual number of deaths per 1000 people
- *Infant mortality rate (IMR):* Annual number of deaths of children less than 1 year old per 1000 live births
- *Expectation of life (Life expectancy):* The number of years which an individual at a given age could expect to live at present mortality levels
- *Total fertility rate (TFR):* Number of live births per woman completing her reproductive life, if her childbearing at each age reflected current ASFRs
- *Gross reproduction rate (GRR):* Number of daughters who would be born to a woman completing her reproductive life at current ASFRs
- *Net reproduction rate (NRR):* Expected number of daughters, per newborn prospective mother, who may or may not survive to and through the ages of childbearing

6. **Ans. (d) Fourth** *[Ref. Park 23/e p479]*

7. **Ans. (d) Low stationary** *[Ref. K. Park 23/e p479]*

8. **Ans. (d) Birth rate tends to fall and death rate declines further** *[Ref. K. Park 23/e p479]*

9. **Ans. (b) Social mobility** *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p18]*
   - *Social mobility :* Socio-economic status of an individual/family ca change/advance over a period of time due to any reason (s), viz attainment of literacy, change in occupation, income change, etc
   - Stories of 'Rags to riches' are common examples.

10. **Ans. (b) Death rate declines faster than birth rate** *[Ref. K. Park 23/e p479]*

Review Question

11. **Ans. (d) Unchanged birth rate & Decreased death rate** *[Ref. Park 23/e p479]*

BIRTH RATE, DEATH RATE AND GROWTH RATE

12. **Ans. (c) 35-47 years** *[Ref. Park 23/e p480, 481]*
    - *Growth rate* (*GR*): Is the change in population overtime, and can be quantified as the 'change in the number of individuals in a population per unit time'
      - *Annual growth rate* (*AGR*): Crude birth rate (BR) *minus* crude death rate (DR)
      - *Decadal growth rate* (*DGR*): Change in population over a decade
    - *Growth rate* (*India*): [Census 2011]
      - *Annual growth rate* (*AGR*): 1.64%
      - *Decadal growth rate* (*DGR*): 17.64%
    - Relation between annual growth rate (AGR) and population:

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Rating	Annual GR (%)	Population doubling time
Stationary population	None	–
Slow growth	< 0.5	> 139 years
Moderate growth	0.5 – 1.0	139 – 70
Rapid growth	1.0 – 1.5	70 – 47
Very rapid growth	1.5 – 2.0	47 – 35
Explosive growth	2.0 – 2.5	35 – 28
Explosive growth	2.5 – 3.0	28 – 23
Explosive growth	3.0 – 3.5	23 – 20
Explosive growth	3.5 – 4.0	20 – 18

- Since India's AGR is 1.64%, it is in very rapid growth phase; Population of India will double in 35–47 years.

Also Remember

- *Population growth models*:*Malthusian Growth Model*: (Simple exponential growth model)
  1. Essentially exponential growth based on a constant rate of compound interest
  2. RULE OF 70: explains the time periods involved in exponential growth at a constant rate. For example, if growth is measured annually then a 1% growth rate results in a doubling every 70 years. At 2% doubling occurs every 35 years.
- *Logistic growth model:* The Malthusian growth model is the direct ancestor of the logistic function

13. Ans. (a) Crude birth rate (CBR) minus Crude death rate (CDR) *[Ref. Park 23/e p481]*

14. Ans. (b) Mid year population *[Ref. Park 23/e p488]*

- *Crude birth rate*: Number of live births in a year per 1000 mid-year population
- *CBR is simplest indicator of fertility*: Total mid-year population is not exposed to child bearing thus it doesnot give true idea of fertility of a population

15. Ans. (a) Live birth/1000 mid year population *[Ref. Park 23/e p488]*

16. Ans. None of the Choices *[Ref. CIA, Website]*

- *Growth rate of few countries*: [2009, CIA]

Country	Growth rate
UAE	3.69 (Highest)
Kuwait	3.55
Afghanistan	2.58
Pakistan	1.56
India	1.41
Bangladesh	1.29
Nepal	1.28
Sri Lanka	0.90
Myanmar	0.78
Northern Mariana Islands	– 7.08 (Lowest)

17. Ans. (b) It is actually a ratio not a rate *[Ref. K. Park 23/e p480, 488]*

- *Crude birth rate (CBR)*: is the natality or childbirths per 1,000 people per year
  - *CBR (World)*: 19.9 per 1000 population (Max 15 Niger; Min 7 Monaco) [2012]
  - *CBR (india)*: 21.8 per 1000 population [2012]
  - Is a measure of fertility
  - CRUDE means it includes all causes and all ages - It is independent of age of population

18. Ans. (a) 2.0% *[Ref. K. Park 23/e p481]*

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19. **Ans. (b) 165 [Hint: Add 10% pregnancy wastage also]** *[Ref. Kamalam, 1/e p288]*
20. **Ans. (a) Rapid growth in population that leads to misbalance in birth and deaths** *[Ref. Rotifera Nine by Shiel, 1/e p103]*

Review Questions

21. **Ans. (b) 1.1%** *[Ref. Park 23/e p481]*
22. **Ans. (a) Mid year population** *[Ref. Gupta & Mahajan 3/e p408; Park 21/e p451, Park 23/e p488]*
23. **Ans. (a) Mid year population** *[Ref. Park 23/e p24]*
24. **Ans. (d) 35-47 year** *[Ref. Park 23/e p481]*
25. **Ans. (a) Broad at base and narrow at apex** *[Ref. Park 23/e p482, 483]*

POPULATION PYRAMID

26. **Ans. (c) 22** *[Ref. NFHS – 3, 2005 – 06; Park 23/e p482]*
    - *Population composition of India*: [NFHS – 3, 2005–06]
      - 0 – 14 years: 34.9% (Children)
      - 15 – 49 years: 49.5% (Reproductive age group)
      - 50 – 59 years: 7.1%
      - > 60 years: 8.5% (Geriatric age group)
    - Women in child-bearing (15 – 44 years) age group constitute 22% of population
27. **Ans. (d) Limiting resource** *[Ref. Wikipedia]*
    - *Carrying capacity*: The supportable population of an organism, given the food, habitat, water and other necessities available within an ecosystem is known as the ecosystem's *carrying capacity* for that organism
      - Refers to the number of individuals who can be supported in a given area *within natural resource limits*, and without degrading the natural social, cultural and economic environment for present and future generations
      - For human population more complex variables (sanitation, medical care) are sometimes considered as part of necessary infrastructure
      - Below carrying capacity, populations typically increase; while above, they typically decrease
      - May depend on a variety of factors including food availability; water supply, environmental conditions and living space
28. **Ans. (c) 51 %** *[Ref. NFHS – 3, 2005–06, IIPS, Volume 1; p21; Park 23/e p482]*

Also Remember

- *Population pyramid*: (age-sex pyramid and age structure diagram) Is a graphical illustration that shows the distribution of various age groups in a population which normally forms the shape of a pyramid
  - *Double Histogram*: 2 back-to-back bar graphs
    1. one showing the number of males and
    2. one showing females in a particular population (Males are conventionally shown on left and females on right)
  - The population (%) is plotted on the X-axis and age on the Y-axis (in 5-year age group intervals)

29. **(b) Developed country** *[Ref. K. Park, 23/e p482, 483]*

SEX RATIO AND DEPENDENCY RATIO

30. **Ans. (a) 940 [Now 940 in Census 2011]** *[Ref. Park 23/e p483]*

Sex Ratio

- *Sex Ratio*: Is defined as number of females per thousand males

$$\text{Sex Ratio} = \frac{\text{No. of Female}}{\text{No. of Male}} \times 1000$$

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- *Sex Ratio* (*India*): [Census 2011]

CENSUS 2001		Sex Ratio
State with Highest Sex Ratio	Kerala	1084
State with Lowest Sex Ratio	Haryana	877
UT with Highest Sex Ratio	Pondicherry	1038
UT with Lowest Sex Ratio	Daman & Diu	618
District with Highest Sex Ratio	Mahe (Pondicherry)	1176
District with Lowest Sex Ratio	Daman (Daman & Diu)	533

Also Remember

- *Interpretation of Sex ratio*:
  - *Ideal Sex Ratio*: Sex ratio of 1000 (equal no. of males & females)
  - *Favourable Sex Ratio*: Sex ratio > 1000 (Females > Males)
  - *Unfavourable Sex Ratio*: Sex ratio < 1000 (Females < Males)
- *Child Sex Ratio*: Is defined as number of female children 0 – 6 years age per thousand male children 0 – 6 years age
  - *Child Sex Ratio* (*India*): 914 [Census 2011] (Highly unfavourable)

31. Ans. (c) Males are less than 5000 *[Ref. Park 23/e p483]*

In the given question
- Total population is 10,000.
- Also, Ideal sex ratio implies 5000 females for 5000 males
- So, Sex ratio is more than 1000, it implies, Females are more than 1000 per 1000 males
- Thus, females are > 5000 and males are < 5000

32. Ans. (d) Population under 15 years and 65 and above *[Ref. Park 23/e p484]*
- *Dependency Ratio* (*DR*): The proportion of persons above 65 years of age and children below 15 years of age are considered to be dependent on economically productive age group (15 – 64 years).

$$DR = \frac{\text{0-15 y population + > 65 y population}}{\text{15-65 y population}}$$

  - *DR* (*India*) *is 62 per 100 or 0.62*: It implies 100 earning people in India are supporting 162 people (100 themselves and 62 non-earning dependents on them)

33. Ans. (c) 66.6% *[Ref. Park 23/e p484]*

Thus, $DR = \frac{30\% + 10\%}{60\%} = 0.66$ or 66.6% or 66 per 100
- *DR of 0.66 or 66/100 or 66% implies*: 100 earning people in that community will have to support 166 people (100 themselves and 66 non-earning dependents on them)

34. Ans. (a) 0-5 yrs age; (b) 6-14 yrs age; (c) 15-45 yrs age; (d) > 65 yrs *[Ref. Park 23/e p484]*

35. Ans. (c) 914 *[Ref. Census of India, 2011]*

36. Ans. (b) Number of persons aged 15 to 65 per one older person aged >/= 65 years *[Ref. Population and Development: Selected Issues, United Nations Series 161, p115]*

Potential support ratio PSR
- Number of persons aged 15 to 65 per one older person aged more than or equal to 65 years
- It gives burden placed on working population
- Is inverse of old age dependency

Review Questions

37. Ans. (b) Haryana *[Ref. Park 23/e p483]*

38. Ans. (c) Since 1901 there is steadily decreasing trend *[Ref. Park 23/e p482, 483]*

39. Ans. (c) 15-65 years *[Ref. Park 23/e p484]*

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LITERACY AND LIFE EXPECTANCY

40. Ans. (*b*) Population age 7 years or more *[Ref. Park 23/e p486]*

- *Literate* (*India*): Any person who can read AND write, WITH understanding, IN ANY ONE language of India AND who is > 7 years if age (definition used in 1991 & 2001 Censuses)
  - *Literacy Rate*: Denominator is population > 7 years age
  - *Crude Literacy Rate*: Denominator is total population (used earlier)
- *Literacy Rate* (*India*): 75.04% [Census 2011]
  - *Literacy rate by sex*: Males – 82% & Females – 65%
  - *Literacy rate by state*: Maximum 94% (Kerala) & Least 64% (Bihar)

Also Remember

- *International Literacy Day*: 8th September (every year)
- *UN definition of Literacy*: Ability to read and write a simple sentence in any language
- *Functional Literacy*: Ability of an individual to use reading, writing, and computational skills efficiently in everyday life situations
- *Transliteracy*: The ability to read, write and interact across a range of platforms, tools and media from signing and orality through handwriting, print, TV, radio and film, to digital social networks
- *Alliteracy*: The state of being able to read but being uninterested in doing so

41. Ans. (c) 65.4 % [Now 75.04% in Census 2011] *[Ref. Park 23/e p486]*

42. Ans. (a) Those above age of 7 years *[Ref. K. Park 23/e p486]*

FERTILITY

43. Ans. (b) Completed family size *[Ref. Park 23/e p489]*

Total Fertility Rate (TFR):

- Is Standardized Index for Fertility Level
- Average no. of children a woman would bear in her reproductive life span; Also known as 'Period Total Fertility Rate'
- Gives magnitude of approximately 'completed family size' – no. of alive children in a family
- Obtained by summing single-year age-specific rates at a given time
- TFR is a synthetic rate: Is not actually counted, as this would involve waiting until women complete childbearing
- TFR (India): 2.68 [NFHS – 3, 2005 – 06]
- *Replacement level of fertility (TFR = 2.1):* TFR at which newborn girls would have an average of exactly 1 daughter over their lifetimes (women have just enough babies to replace themselves)
  - Replacement TFR (industrialized countries) = 2.1
  - Replacement TFR (developing countries) = 2.5 – 3.3
  - Replacement TFR (globally) = 2.33

44. Ans. (a) 18.6 per 1000 population *[Ref. Internet]*

- *Relationship between Crude birth rate* (*CBR*) *and Total fertility rate* (*TFR*):
  CBR = (8 × TFR) + 1 [approx.]
  In the given question, the total fertility rate in India is 2.2
  Thus, CBR = (8 × 2.2) + 1 = 17.6 + 1 = 18.6

45. Ans. (d) Sample registration system *[Ref. Park 23/e p841]*

- *Sample Registration System (SRS)* was initiated in 1964–65 (on a pilot basis; full scale from 1969–70) to provide national as well as state level reliable estimates of fertility and mortality
- *SRS is a dual record system:*
  - *Field Investigation:* continuous enumeration of births and deaths by an enumerator
  - *Independent retrospective survey:* every 6 months by an investigator-supervisor
- *Findings of SRS Bulletin: 2014*:
  - Crude Birth Rate (CBR): 21.4 per 1000 mid-year population

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- Crude Death Rate (CDR): 7.0 per 1000 mid-year population
- Natural Growth Rate: 14.5 per 1000 mid-year population
- Infant Mortality Rate (IMR): 40 per 1000 live births

Also Remember

- *Civil Registration System* (*CRS*): Birth and death registration system is technically known as CRS
  - Births, deaths and still-births are required to be each registered to the concerned Registrar within 21 days of its occurrence
- *Census*: Total process of collecting, compiling, analyzing or otherwise disseminating demographic, economic and social data pertaining, at a specific time, of all persons in a country or a well-defined part of a country
  - Provides snapshot of the country's population and housing at a given point of time
- *Ad-hoc survey*: Is a survey without any plan for repetition

46. Ans. (d) General Fertility Rate *[Ref. Park 23/e p488]*

Also Remember

- *GFR is a better measure of fertility than CBR*: as denominator is restricted to no. of women in child-bearing age, rather than the whole population
- *Major weakness of GFR*: Not all women are exposed to risk of child birth
- *Measurements of birth rates*:
  - Crude birth rate (CBR)
  - General fertility rate (GFR)
  - Standardized birth rate
  - Total fertility rate (TFR)

47. Ans. (a) 2 *[Ref. Park 23/e p489]*
- GRR or NRR = ½ TFR (approximately)

48. Ans. (a) Total fertility rate *[Ref. Park 23/e p489]*

49. Ans. (b) Measure of completed family size; (c) Sum of fertility of all age; (e) Total no. of children born to a mother *[Ref. Park 23/e p489]*

50. Ans. (a) < 1 *[Ref. Park 23/e p489]*
- *Replacement level of fertility (TFR = 2.1, i.e. NRR = 1)*: TFR at which newborn girls would have an average of exactly 1 daughter over their lifetimes (women have just enough babies to replace themselves)
  - Is also known as 'Adequate level'

51. Ans. (b) G.F.R.; (c) T.F.R. (d) Maternal mortality rate *[Ref. Park 23/e p488, 489]*

52. Ans. (c) Reproductive women in the age group 15-45 mid year population *[Ref. K. Park 23/e p488]*
- *General fertility rate (GFR)*: Number of live births per 1000 women in the reproductive age-group 15-49 years in a given year
- *Denominator*: takes 'mid-year population' of 15-49 years age females into account

53. Ans. (c) 60% *[Ref. K. Park 23/e p489]*
- To achieve NRR = 1, CPR > 60%
- Then population will stablize by 2045

54. Ans. (b) Measure of fertility *[Ref. K. Park 23/e p488]*

55. Ans. (c) NRR *[Ref. K. Park 23/e p489]*

56. Ans. (a) TFR *[Ref. K. Park 23/e p489]*

57. Ans. (d) No. of female children a newborn girl has in her life time taking into account mortality *[Ref. Park 22/e p451]*

58. Ans. (c) Gross Reproduction Rate *[Ref. Park 23/e p489]*

Review Questions

59. Ans. (d) All of the above *[Ref. Park 23/e p488]*

60. Ans. (c) NRR *[Ref. Park 23/e p489]*

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MISCELLANEOUS (DEMOGRAPHY)

61. Ans. (c) 21 days *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p330]*

- *Civil Registration System* (*CRS*): Birth and death registration system is technically known as CRS

Also Remember

- *Registration of name of the child*:
  - *Within 12 months of birth registration*: Free of charge
  - *After 12 months of birth registration till 15 years*: Rupees 5.00
- *Coverage of registration of births and deaths in India*:
  - *Coverage of births registration in India*: 55%
  - *Coverage of deaths registration in India: 46%*

62. Ans. (b) 13.8 *[Ref. K. Park 23/e p557]*

In the given question, a community has a population of 10,000 and a birth rate of 36 per 1000;
Since 36 births per 1000, there will be 360 births per 10,000 population in the given year
Also, 5 maternal deaths were reported in the current year,

$$\text{Thus, MMR} = \frac{\text{No. of maternal deaths}}{\text{Total no. of live birth s in the year}} \times 100{,}000$$

$$\text{MMR} = \frac{5}{360} \times 100{,}000 = 1388 \text{ per } 100{,}000 \text{ LB} = 13.88 \text{ per } 1000 \text{ LB}$$

63. Ans. (a) 1st March *[Ref. National Health Programs of India by Dr. J. Kishore, 7/e p572, 662]*

- *Census Stop* (*Census Movement*): 00.00 hrs 01 March 2011 (The referral time and date at which snapshot of the population is taken)

64. Ans. (c) 29% *[Ref.Park 23/e p700]*

- *Poverty:* Deprivation of those things that determine the quality of life, including food, clothing, shelter and safe drinking water, but also such 'intangibles' as the opportunity to learn, to engage in meaningful employment, and to enjoy the respect of fellow citizens
  - *Absolute poverty:* a set standard which is consistent over time and between countries
  - *Relative poverty:* as being below some relative poverty threshold
- *Poverty threshold (poverty line):* Is the minimum level of income deemed necessary to achieve an adequate standard of living
- Definitions of Below Poverty Line (BPL):
  - *Based on per capita caloric intake per day*:
    1. *Rural areas:* per capita daily caloric intake < 2400 Kcal
    2. *Urban areas:* per capita daily caloric intake < 2100 Kcal
  - *Based on per capita expenditure per month:* [New Guideline Tendulkar Committee 2011-12]
    1. *Rural areas:* Per capita expenditure per day INR 27/- [INR 32 - Rangarajan Committee]
    2. *Urban areas:* Per capita expenditure per day INR 33/- [INR 47 - Rangarajan Committee]
  - *Based on criteria for International comparisons* (*World Bank*):
    1. *Extreme poverty*: Living on <1.25 $ per person per day
    2. *Moderate poverty*: Living on <2 $ per person per day
- *Poverty in India*:
  - *Most obvious problem of India*
  - *Population living BPL in India*: 22% [2013] [29.5% Rangarajan Committee 2014]

65. Ans. (c) Three rounds *[Ref. National Health Programs of India by Dr. J. Kishore, 8/e p37; Park 23/e p487]*

National Family Health Survey (NFHS)

- Is a large-scale, multi-round survey conducted in a representative sample of households throughout India
- *3 rounds of the survey have been conducted till date,*
  - NFHS–1: 1992–93
  - NFHS–2: 1998–99
  - NFHS–3: 2005–06

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66. Ans. (c) Population pyramid *[Ref. K. Park 23/e p483]*

- *Population pyramid:* (age-sex pyramid or age-structure diagram) Is a graphical illustration that shows the distribution of various age groups in a population which normally forms the shape of a pyramid
  - *Double Histogram:* 2 back-to-back histogram graphs
    1. one showing the number of males and
    2. one showing females in a particular population (Males are conventionally shown on left and females on right)
  - The population (%) is plotted on the X-axis and age on the Y-axis (in 5-year age group intervals)

Figure: Age and sex pyramid

Also Remember

- *Life table analysis:* Biometer of Population
  - Core demographic technique to analyze mortality and other non-renewable processes
  - Is a special type of 'Cohort Analysis'
  - Is an example of 'Indirect Standardization'
  - Used for:
    1. Mortality (Life expectancy)
    2. Natality
    3. Reproduction (Contraceptive use/failure rates)
    4. Chances of survival (Survival curves)
- *Correlation coefficient (r):* indicates the strength and direction of a linear relationship between two random variables
  - *Correlation coefficient (r) lies between* –1 and +1 ($-1 < r < +1$)
- *Bar chart*: is a chart with rectangular bars of lengths proportional to that value that they represent
  - Bar chart is for *'non-continuous qualitative data'*
  - Bar charts are used for comparing two or more values
  - Bars can be horizontally or vertically oriented

67. Ans. (a) 50 *[Ref. Park 21/e p523, Park 22/e p525]*

- *Infant mortality rate* (*IMR*): Is the ratio of infant deaths registered in a given year to the total number of live births registered in the same year; IMR is usually expressed as a rate per 1000 live births (LB)

  In the given question, in a town of 36,000 people, there are 1200 live births, and 60 infant deaths,
  Thus, IMR = = 50 per 1000 LB

68. Ans. (b) IMR *[Ref. Park 23/e p567]*

- *Most important indicator of health status of a country:* IMR

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Also Remember

- *Couple Protection rate* (*CPR*):
  - *CPR is percent of eligible couples effectively protected* against one or the other approved methods of family planning, viz. condoms, OCPs, IUDs, sterilization

69. Ans. (c) Hyderabad *[Ref. Park 21/e p448, Park 22/e p446]*

- *UN Classification of urban agglomerations*:

Classification	Population count
Mega city	> 10 millions
Million-plus city	1 – 10 millions
Major city	0.1 – 1 million (1 – 10 Lac)
Town	< 0.1 million (<1 Lac)

- *Megacity:* Is defined as a metropolitan area with
  - *Total population*: in excess of 10 million people
  - *A minimum level for population density*: 2,000 persons/square km
- In World (2005), there were 25 megacities
- In India, 3 cities (Delhi, Mumbai, Kolkata) are included in the list of 'Mega Cities' (population > 10 millions)
  - Population projections indicate that by 2015, Hyderabad will also become a Mega City
- *Urban area with maximum population the world:* Tokyo
- *Largest mega city in the world:* Tokyo

Also Remember

- *Global city* (*World city*): Is a city deemed to be an important node point in the global economic system
- *Primate city:* Is a major city that works as the financial, political, and population center of a country and is not rivaled in any of these aspects by any other city in that country
  - Normally, a primate city must be at least twice as populous as the second largest city in the country
  - India has no primate city: It has four main cities of Delhi, Mumbai, Kolkata and Chennai
- *Metropolis*: Is a big city, in most cases with over half a million inhabitants in the city proper, and with a population of at least one million living in its urban agglomeration

70. Ans. (a) 10-19 years of age *[Ref. A Picture of Health – A Review and Annotated Bibliography of the Health of Young People in Developing Countries by Goodburn, Elizabeth and Ross (WHO & UNICEF) 1995]*

- *Adolescence*: Is a transitional stage of physical and mental human development that occurs between childhood and adulthood
- The World Health Organization (WHO) defines adolescence as the period of life between 10 and 19 years of age

71. Ans. (c) 10 *[Ref. Park 23/e p840]*

72. Ans. (c) 2005 *[Ref. National Health Programs of India by Dr. J. Kishore, 8/e p37]*

73. Ans. (c) 5 years *[Ref. National Health Programs of India by Dr. J. Kishore, 8/e p37]*

74. Ans. (a) 1881 *[Ref. K. Park 22/e p783]*

75. Ans. (a) High literacy rate; (d) Older age of marriage; (e) Higher Life expectancy *[Ref. Multiple documents]*

76. Ans. (b) 1998-99 *[Ref. National Health Programs of India by Dr. J. Kishore, 8/e p37]*

77. Ans. (a) 6 months *[Ref. K. Park 23/e p841]*

78. Ans. (a) Breast Imaging Reporting and Data System *[Ref. Breast Ultrasound by AV Stavros, 1/e p6]*

79. Ans. (b) 1871 *[Ref. K. Park 23/e p84]*

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80. **Ans. (a) Total population doubled from 1921 to 1971; (b) Annual average growth rate 1.64% in 2011 census; (e) Decadal growth rate 17.64% in 2011** *[Ref. Park 23/e p479-481]*

81. **Ans. (a) Done by Ministry of Home Affairs; (c) Census Commissioner is the supreme head** *[Ref. Park 23/e p840]*

82. **Ans. (d) Within 60 days of arrival into India** *[Ref. Handbook of Civil Registration, Government of India, p49]*

83. **Ans. (b) Kerala** *[Ref. Park 23/e p23]*
    - *Kerala is considered 'Yardstick for judging health status in India':* Kerala has achieved high levels of health (similar to Develop countries) even on moderate levels of income through Strong political commitment to equitable socio-economic development.

	Kerala	India
Birth rate (per 1000 MYP)	15.1	23.1
Death rate (per 1000 MYP)	6.9	7.0
IMR (per 1000 LB)	12	42
Annual growth rate	0.8%	1.45%
Life expectancy at birth	73 (M), 77 (F)	67 (M), 69 (F)
Literacy rate	91%	74%
Per capita income (2012)	₹ 103,820	₹ 74,380
Mean age at marriage (F)	22.9 years	21.2 years

Review Questions

84. **Ans. (a) Pyramid** *[Ref. Park 23/e p483]*

85. **Ans. (d) Survey should be done every year** *[Ref. Park 23/e p841]*

86. **Ans. (b) 1921** *[Ref. Park 23/e p482]*

87. **Ans. None [Both 21 days]** *[Ref. Park 23/e p840, 841]*

88. **Ans. (c) Sample registration Surgery** *[Ref. Park 23/e p841]*

89. **Ans. (b) Age standardized death rate** *[Ref. Park 23/e p57]*

90. **Ans. (a) Sample registration system** *[Ref. Park 23/e p841]*

FAMILY PLANNING AND CONTRACEPTION

CONCEPTS OF FAMILY PLANNING

91. **Ans. (c) 10 per HWY** *[Ref. Park 23/e p510]*
    - *PEARL INDEX (PI) as measure of contraceptive efficacy*
      - *PI or Pearl rate*: MC technique used in clinical trials for measuring the effectiveness of a birth control method
      - PI is no. of failures per 100 woman years (HWY) of exposure

$$\text{Pearl Index (PI)} = \frac{\text{Total accidental pregnancy}}{\text{Total months of exposure}} \times 1200$$

In the given question,

Total accidental pregnancies = 20

Total months of exposure = 100 couples × 24 months each = 2400 months

$$\text{Thus, PI} = \frac{20}{2400} \times 1200 = 10 \text{ per HWY}$$

92. **Ans. (b) Pearl Index and Life table analysis** *[Ref. Park 23/e p510]*
    - *Contraceptive Efficacy*: Is assessed by measuring the number of unplanned pregnancies that occur during a specified period of exposure and use of a contraceptive method. Two methods used are:

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- Pearl Index
- Life table analysis

- *Life Table Analysis* (*LTA*) *as measure of contraceptive efficacy*:
  - LTA calculates a failure rate per month of use
  - Better measure than PI

Also Remember

- *Couple Protection Rate* (*CPR*): Is an indicator of prevalence of contraceptive practice in a community

$$CPR = \frac{\text{Total no. of ECs protected by any of 4 approved methods}}{\text{Total no. of ECs in the community}} \times 100$$

93. Ans. (c) 150 – 180 *[Ref. Park 23/e p492]*

- *Eligible couples* (*ECs*): A currently married couple with wife in reproductive age group (15–45 years age)
  - ECs are in need of family planning services
  - There are 150 – 180 ECs per 1000 population in India
  - 20% ECs are in age group 20–24 years
  - EC register, a basic document for organizing family planning work, is maintained at Subcentre
  - Total no. of ECs in a community is used (as a denominator) in the calculation of Couple Protection Rate (CPR)

94. Ans. (c) 25% *[Ref. Internet; Park 23/e p493]*

- *Couple Protection rate* (*CPR*):
  - *CPR is percent of eligible couples* (*ECs*) *protected* against one or the other approved methods of family planning, viz. condoms, OCPs, IUDs, sterilization
  - *NRR = 1 can be achieved if*: CPR >60%
  - *CPR* (*India*): 46.5% [2009-10]
  - *Goal for CPR in RCH – II* (*2004 – 09*): > 65%
  - CPR is an indicator of prevalence of contraceptive practice in a community
- *Effective Couple Protection rate* (*ECPR*):
  - *ECPR is percent of eligible couples* (*ECs*) *protected* against one or the other approved methods of family planning, viz. condoms, OCPs, IUDs, sterilization Taking into Account Their Effectivity
  - *Effectivity of approved contraceptive methods*:
    1. Condoms: 50%
    2. IUDs: 95%
    3. OCPs: 100%
    4. Sterilization (Vasectomy or Tubectomy): 100%

In the given question, ECs = 180

Contraceptive methods used	No. of couples using contraception	Effectivity of contraceptive methods	Effectively protected couples
Condoms	29	*50%*	14.5
IUDs	10	*95%*	9.5
Oral Pills	10	*100%*	10
Vasectomy	03	*100%*	03
Tubectomy	08	*100%*	08
Total	60	–	45

Thus, $CPR = \frac{60}{180} = 33.3\%$ and $ECPR \frac{45}{180} = \times 100 = 25\%$

95. Ans. (c) Screening for HIV infection *[Ref. Park 23/e p510]*

- *Modern concept of family planning*: Family planning is not synonymous with birth control only. A WHO Expert Committee (1970) recommends that family planning includes in its' purview:
  - Proper spacing and limitation of births

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- Advice on sterility
- Education for parenthood
- Sex education
- Screening for pathological conditions related to reproductive system (e.g. Cervical cancer)
- Genetic counseling
- Marriage counseling
- Premarital consultation and examination
- Carrying out pregnancy tests
- Preparation of couples for arrival of their 1st child
- Providing services for unmarried mothers
- Teaching home economics and nutrition
- Providing adoption services

96. Ans. (b) Total accidental pregnancy *[Ref. Park 23/e p510]*

97. Ans. (b) Failures per 100 women-years of exposure *[Ref. K. Park 23/e p510]*

98. Ans. (b) Accidental pregnancies per 100 women-years of exposure *[Ref. K. Park 23/e p510]*

Review Questions

99. Ans. (a) Annual general marriage rate *[Ref. Park 23/e p489]*

100. Ans. (c) 3 *[Ref. Park 23/e p510]*

101. Ans. (a) Effectiveness of a contraceptive *[Ref. Park 23/e p510]*

102. Ans. (a) By spacing between the pregnancies *[Ref. Park 23/e p488]*

103. Ans. (d) Contraceptive failures *[Ref. Park 23/e p510]*

104. Ans. (d) All of the above *[Ref. Park 23/e p493]*

NATURAL METHODS

105. Ans. (a) Terminal Methods *[Ref. Park 23/e p507]*

Natural Family Planning Methods:

- *Basal Body Temperature (BBT) Method:*
  - *Depends on*: Rise of temperature (0.3° – 0.5° C) at ovulation
  - *Occurs due to*: Increased progesterone production
- *Cervical Mucus Method*:
  - Also known as *'Billing's Method'* or *'Ovulation Method'*
  - *Based on*: Changes in characteristics of cervical mucus
    1. At ovulation: Watery, clear, smooth, slippery, profuse (like Egg white)
    2. After ovulation: Thickens and lessens in quantity
- *Symptothermic Method*:
  - Combines temperature, cervical mucus and calendar techniques

Also Remember

- *Only method of birth control which is completely effective*: Sexual abstinence
- *Oldest method of voluntary fertility control*: Coitus interruptus
- *Safe period* (*Rhythm method/Calendar method*):
  - *Fertile period*: Shortest cycle *minus* 18 days (Last day of fertile period: Longest cycle *minus* 10 days)
  - *Drawbacks*: PROGRAMMED SEX: Abstinence required for ½ month

Review Question

106. Ans. (c) Symptothermic method *[Ref. Park 23/e p507]*

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BARRIER METHODS

107. Ans. (b) A - II, B - I, C - IV, D – III *[Ref. Park 23/e p494-505]*

- *Vaginal Sponge*: Today (brand name)
  - *Sponge a barrier method of contraception*: It actually combines barrier and spermicidal methods to prevent conception
  - Saturated with 1000 mg of spermicide *'Non-oxynol–9'*
  - *Disadvantages of sponge*:
    1. Sponge provide no protection from STIs
    2. Can lead to Toxic Shock Syndrome
- *Norplant*: Subdermal implant (Depot formulation)
  - *6 silastic capsules containing 35 mg LNG each*
    1. Norplant R2: 2 capsules containing 75 mg LNG each
  - *Disadvantages*: Irregularities of menstrual bleeding
- *NET–EN*: Norethisterone Enanthate, a Progestogen only Injectable contraceptive (Depot formulation)
  - Dose: 200 mg i/m every 2 months
  - Side effects: Disruptions of normal menstrual cycles
- *Grafenberg's ring*: 1st Generation (Non-medicated/Inert) IUD [Similar to Lippes loop]

Also Remember

- *DIAPHRAGM*: Is a cervical barrier type of birth control
  - It must be inserted sometime before sexual intercourse, and remain in the vagina for 6 – 8 hours after a man's last ejaculation
  - *Disadvantages*:
    1. Increased risk of UTI, yeast infection & bacterial vaginosis
    2. Toxic Shock Syndrome (if left in-situ > 24 hours)
- *DMPA* (*Depot Medroxy Progesterone Acetate*): a Progestogen only Injectable contraceptive (Depot formulation)
  - *Dose*: 150 mg i/m every 3 months

108. Ans. (d) Lippes loop *[Ref. Park 23/e p496]*

109. Ans. (c) 9-20/100 women years *[Ref. K. Park 23/e p495]*

Review Questions

110. Ans. (c) 9-Nonoxynol *[Ref. Park 23/e p495]*

IUDS

111. Ans. (c) Surface area of copper in sq. mm *[Ref. Park 23/e p496, 497]*

- In CuT 7, CuT 220 B and CuT 380 A or Ag,
  - *Numbers* (*7, 220, 380*) *represent*: Surface area of copper (in sq. mm) on the device
  - *B in CuT 220 B represent*: Size of IUD (IUDs were earlier available in different sizes – A, B, C and D; D was the largest size)
  - *A or Ag in CuT 380 A represent:* Silver or Gold (with copper)
- *IUDs are world's most widely used method of reversible birth control*
- *Change of IUD:* (Shelf life of copper IUDs)

IUD	Approved years of use
Copper IUDs	3 – 5
Progestasert	1
CuT 200	4
NOVA T	5
LNG IUD	7 – 10
CuT 380 A	10

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- Non-hormonal (copper) IUDs are considered safe to use while breastfeeding
- All 2nd generation copper-T IUDs have failure rates of less than 1% per year

112. Ans. (a) Bleeding *[Ref. Park 23/e p498, 499]*

Also Remember

- *IUDs associated with side effects or complications:*

Side effects or complications	IUD most commonly associated
Highest pregnancy rate	Lippes Loop
Lowest pregnancy rate	LNG – IUD
Highest expulsion rate	Lippes Loop
Lowest expulsion rate	Progestatsert
Highest removal rate	LNG – IUD
Lowest removal rate	Progestatsert

113. Ans. (*c*) Progestasert is implanted subdermally *[Ref. Park 23/e p496]*

Progestasert

- *Progestasert is a 3rd Generation IUD* (Medicated/Bio-active IUD)
- Progestasert was the *'first hormonal uterine device'*, developed in 1976
- *T-shaped device filled with 38 mg progesterone*
- *Rate of hormone release*: 65 mcg per day
- *Shelf life*: 1 – 1½ years
- *Advantages of Progestasert*:
  - IUD with *'Lowest expulsion rate'*
  - IUD with *'Lowest removal rate'*

114. Ans. (b) Pain *[Ref. Park 23/e p498]*

115. Ans. (c) Has a history of ectopic pregnancy *[Ref. Park 23/e p497]*

- *Ideal IUD woman candidate* (*Planned Parenthood Federation of America PPFA*):
  - Who has borne atleast one child
  - Has no history of pelvic disease
  - Has normal menstrual periods
  - Is willing to check the IUD tail
  - Has access to follow-up and treatment of potential problems
  - Is in a monogamous relationship
- However, the federation does not rule out women who do not conform to this profile
- American College of Obstetricians and Gynaecologists (1985) stated that 'IUDs are not recommended for women who have not had children or who have multiple partners, because of the risk of PID and possible infertility'

Also Remember

- *Contraindications for IUDs use:*
  - *Absolute contraindications*:
    1. Suspected pregnancy
    2. PID
    3. Vaginal bleeding of undiagnosed etiology
    4. Cancer of cervix, uterus or adnexa and other pelvic tumors
    5. Previous ectopic pregnancy
  - *Relative contraindications:*
    1. Anemia
    2. Menorrhagia
    3. History of PID since last pregnancy
    4. Purulent cervical discharge
    5. Distortions of uterine cavity due to congenital malformations, fibroids
    6. Unmotivated persons

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116. Ans. (a) Multiload Cu-375 is a third generation IUD *[Ref. Park 23/e p497]*

- *Pregnancy rates of IUDs (clinical experience):*

Device	Pregnancy rate (%)	Expulsion rate (%)	Removal rate (%)
Lippes Loop	3	12 – 60	12 – 15
CuT 7	3	6	11
CuT 200	3	8	11
CuT 380 A	0.5 – 0.8	5	14
Progestasert	1.5	3	10
LNG IUD	0.2	6	17

- *Levonorgestrel releasing IUD (LNG IUD) has an effective life of 10 years:* it releases LNG at the rate of 20 mcg per day.

117. Ans. (d) 8 weeks *[Ref. Park 23/e p497-498]*

Timings of IUD Insertion

- *During menstruation or within 10 days of beginning of menstrual period*:
  - Best time for IUD insertion
  - Cervical canal diameter greatest, lesser expulsion, least risk of pregnancy
- *Immediate post-partum insertion*: During 1st week after delivery before woman leaves hospital
  - High chance of perforation
  - High chance of expulsion
- *Post-puerperal insertion*: 6 – 8 weeks after delivery
  - Can be combined with follow-up visit of mother and child
  - Not recommended after 2nd trimester abortion

118. Ans. (c) CuT 380 A *[Ref. Park 23/e p496]*

119. Ans. (d) 10 yrs *[Ref. K. Park 23/e p497]*

120. Ans. (c) 1st generation IUDs *[Ref. Park 23/e p496]*

121. Ans. (b) 5 *[Ref. Park 23/e p496]*

122. Ans. (a) Prevent fertilization *[Ref. Park 23/e p497]*

- *IUD cause a foreign body reaction:*
  - Cellular and biochemical reaction in endometrial and uterine fluids
  - Impaired viability of gamete reduces chances of fertilization

123. Ans. (b) MIRENA *[Ref. Family Medicine by Rakel, 9/e p614]*

- *Mirena IUD: Levonorgestrel-releasing intrauterine contraceptive system measuring 32 × 32 mm placed for up to 5 years*

Review Questions

124. Ans. (a) Silver core *[Ref. Park 23/e p496]*

125. Ans. (b) Barium sulphate *[Internet]*

126. Ans. (b) Silver core *[Ref. K. Park 23/e p496]*

127. Ans. (d) Low risk of ectopic pregnancy *[Ref. Park 23/e p497]*

128. Ans. (c) Hormonal effect on mucosa of endometrium *[Ref. Park 23/e p496, 497]*

129. Ans. (c) PID *[Ref. Park 23/e p498]*

130. Ans. (b) Second generation IUCD *[Ref. Park 23/e p496]*

131. Ans. (a) CuT 380 A *[Ref. Park 23/e p496]*

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HORMONAL METHODS

132. Ans. (c) Centchroman is useful for females with PCOD *[Ref. Shaw's Textbook of Gynaecology 14/e p213]*

CENTCHROMAN

- *Synthetic NON-STEROIDAL oral contraceptive*
- *Brand name*: Saheli
- *Chemical in Centchroman*: ORMELOXIFENE
- *Mechanism of Action*: Selective estrogen receptor modulators (SERMs) a class of medication which acts on the estrogen receptor
  - Works through a unique combination of weak estrogenic and potent anti-estrogenic properties
- *Developed by*: Central Drug Research Institute (CDRI), Lucknow, India
- *Dosage & frequency*: 1 tablet (30 mg) twice a week X 3 months, then 1 tablet per week
- *Failure rate* (*Pearl Index*): 1.83 – 2.84 per HWY
- *Contraindications of Centchroman*:
  - PCOD (Stein Leventhal Syndrome)
  - Cervical hyperplasia
  - Recent history of jaundice
  - Severe allergic disease

Also Remember

- Centchroman is also known as *'once-a-week pill'*
- Centchroman is the *'only anti-implantation agent approved for clinical use'* globally

133. Ans. (*d*) I, II and III *[Ref. Park 23/e p502, 503]*

- *Adverse effects of Combined Oral Contraceptive Pills* (*OCPs*):
  - *Cardiovascular effects*: (*due to oestrogenic component*)
    1. Myocardial infarction
    2. Cerebral thrombosis
    3. Venous thrombosis (with or without pulmonary embolus)
    4. Hypertension
  - *Carcinogenesis*:
    1. Cervical cancer (increased risk)
    2. Breast Cancer
  - *Metabolic Effects*: (*due to progesterone component*)
    1. Elevated blood pressure (hypertension)
    2. Altered lipid profile (reduced HDL)
    3. Blood clotting
    4. Hyperglycemia and increased plasma insulin
  - *Hepatocellular adenoma*
  - *Gall bladder disease*
  - *Cholestatic jaundice*
  - *Monolial vaginitis* (*candidiasis*)
  - *Decline milk volume during lactation*
  - *General effects:*
    1. Breast tenderness
    2. Weight gain (due to water retention)
    3. Headache & migraine
    4. Bleeding disturbances
- *Beneficial effects of Combined Oral Contraceptive Pills* (*OCPs*):
  - *Benign breast disorders* (*Fibrocystic disease, Fibroadenoma*)
  - *Benign ovarian disease* (*Ovarian cysts*)
  - *Malignant ovarian disease* (*Ovarian cancer*)
  - *Pelvic Inflammatory Disease* (*PID*)
  - *Ectopic pregnancy*

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- *Iron deficiency anemia*
- *Endometrial cancer*

134. Ans. (d) 1, 2 and 3 *[Ref. Park 23/e p502, 503]*

135. Ans. (d) Hepatocellular adenoma *[Ref. Park 23/e p502]*

136. Ans. (a) 20 *[Ref. Internet, Organon-India website]*

- *Composition of 'New Low dose OCP'*: (Brand name: *Femilon/ Elogen*)
  - Ethinyl estradiol: 0.02 mg (20 mcg)
  - Desogestrel: 0.15 mg (150 mcg)
- *Composition of Combined OCP*: (*MALA-N*)
  - Ethinyl estradiol: 0.03 mg (30 mcg)
  - Norgestrel: 0.15 mg (150 mcg)

Also Remember

- *Composition of few contraceptives:*
  - *Centchroman* (Brand name: *Saheli*): Ormeloxifene
  - *TODAY* (vaginal sponge): Non-oxynol–9
  - *Male condom* (common) : Latex
  - *Female condom* (common) : Polyurethane
  - *Norplant*: Levonorgestrel (LNG)
  - *CuT 380 A or Ag*: Copper + Silver or Copper + Gold
  - *Minipill* (Brand name: *Cerazette*) : Progesterone

137. Ans. (a) Nursing mothers *[Ref. Park 23/e p503]*

- *Contraindications for use of oral contraceptive pills* (*OCPs*):

Absolute contraindications:	Relative contraindications: (require medical surveillance)
1. Breast Cancer	1. Age > 40 years
2. Genital Cancer	2. Smoking and age >35 years
3. Liver disease	3. Mild hypertension
4. History of thromboembolism	4. Chronic renal disease
5. Cardiac abnormalities	5. Epilepsy
6. Congenital hyperlipidemia	6. Migraine
7. Undiagnosed abnormal uterine bleeding	7. Nursing mothers (0 – 6 months)
8. Pregnancy	8. Diabetes mellitus
	9. Gall bladder disease
	10. History of infrequent bleeding
	11. Amenorrhoea

138. Ans. (d) Supplied free of cost *[Ref. Park 23/e p500]*

	MALA – N	MALA – D
Type of contraceptive	Combined OCP	Combined OCP
Estrogen	Ethinyl estradiol (0.03 mg)	Ethinyl estradiol (0.03 mg)
Progesterone	Norgestrel (0.15 mg)	Desogestrel (0.15 mg)
Status in RCH	Provided free of cost	Provided at a subsidized cost (Rs. 5/- per packet)

139. Ans. (a) Liver disease; (c) Renal disease; (d) Epilepsy *[Ref. Park 23/e p503]*

140. Ans. (a) Combined OCPs *[Ref. K. Park 23/e p503]*

141. Ans. (a) Iron deficiency anaemia; (c) Ovarian cancer; (d) PID; (e) Ovarian cysts *[Ref. Park 23/e p502]*

142. Ans. (b) Lactating females *[Ref. K. Park 23/e p501]*

143. Ans. (b) PID; (c) Ovarian cysts; (d) Fibrocystic disease of breast; (e) Ectopic pregnancy *[Ref. Park 23/e p502]*

144. Ans. (d) Protection against cervical cancer *[Ref. Park 23/e p502]*

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Review Questions

145. **Ans. (a) Monolial vaginitis** *[Ref. Park 23/e p502]*
146. **Ans. (c) 3 months** *[Ref. Park 23/e p503]*
147. **Ans. None** *[Ref. Park 23/e p502]*
148. **Ans. (a) Leg vein thrombosis** *[Ref. Dutta 6/e p 543,546; Park 23/e p502]*
149. **Ans. (d) Pervaginal bleeding** *[Ref. Park 23/e p502]*
150. **Ans. (b) Hepatic adenoma** *[Ref. Park 23/e p502]*
151. **Ans. (a) Mini pill** *[Ref. Park 23/e p501]*
152. **Ans. (b) 30 µgm** *[Ref. Park 23/e p500]*
153. **Ans. (d) Congenital hyperlipidemia** *[Ref. Park 23/e p503]*
154. **Ans. (a) 0.15 mg** *[Ref. Park 23/e p500]*
155. **Ans. (a) Only progesterone is small quantity** *[Ref. Park 23/e p501]*
156. **Ans. (c) Three months** *[Ref. Park 23/e p503]*

EMERGENCY METHODS

157. **Ans. (*a*) Female condoms** *[Ref. National Health Programs of India by Dr. J. Kishore, 8/e p120-22]*

Also Remember

- *Female condoms*: A device that is used during sexual intercourse
  - Invented by Danish MD Lasse Hessel
  - It is worn internally by the receptive partner and physically blocks ejaculated semen from entering that person's body
  - Prevent pregnancy and transmission of STIs
  - Three types:
    1. FC Female condom: made of polyurethane
    2. FC2: made of nitrile polymer
    3. Latex
  - Only tool for HIV prevention that women can initiate & control
- *Male condoms versus female condoms:*

Characteristic	Male condoms	Female condoms
Material commonly used	Latex	Polyurethane*
Pearl Index (failure rate)	2–14 per HWY	5–21 per HWY
No. of rings	1	2 (outer & inner)
Reusable	No	Yes
Covering skin around external genitals	No	Yes
Compatible with oil based lubricants	No	Yes
Insertion requires male erection	Yes	No
Prevention of pregnancy	Yes	Yes
Prevention of STIs	Yes	Yes

(* Now also made of nitrile polymers, known as FC2)

158. **Ans. (b) Emergency contraception with OCPs** *[Ref. National Health programs of India by Dr J. Kishore, 8/e p121]*
- *Phrase 'morning-after pill' is figurative*: Combined OCPs can be used for up to 72 hours after sexual intercourse
- Insertion of an IUD is more effective than use of Emergency Contraceptive Pills
- POP as an Emergency Contraceptive has showed greater efficacy with reduced side effects and has therefore superseded Yuzpe & Lancee method (WHO)
  - *A single dose of 100 mg mifepristone is also more effective than the Yuzpe regime*
- MC side effect reported by users of emergency contraceptive pills: Nausea

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159. Ans. (a) LNG- Intrauterine device *[Ref. Park 23/e p501]*

Recommended Methods of Post Coital (Emergency) Contraception

- *Intra-uterine devices (IUDs)*:
  - CuT within 5 days
- *Hormonal*:
  - LNG oral tablet (0.75 mg): 1st tablet within 72 hours of intercourse and 2nd tablet after 12 hours of first dose
  - Combined OCPs (high estrogen 50 mcg): 2 pills within 72 hours of intercour + 2 pills after 12 hours
  - Combined OCPs (low estrogen 30 mcg): 4 pills within 72 hours of intercour + 4 pills after 12 hours
- Oral Mifespristone 10 mg once within 72 hours

160. Ans. (d) 72 hours *[Ref. Park 23/e p501]*

Yuzpe and Lancee Method

- Method: Combined oral pills are generally accepted as the preparation of choice for Post-coital (Emergency) contraception
- Regimens have to be 'completed within 72 hours of coitus': Sooner started, the more effective it is
- Regimens:
  - Current recommendation (pills with 30 mcg oestrogen Mala-N/ Mala-D): 4 pills immediately followed by 4 pills 12 hours later
  - Standard method (pills with 50 mcg oestrogen): 2 pills immediately followed by 2 pills 12 hours later
  - Pills with 200 mcg estrogen: 1 pill immediately followed by 1 pill 12 hours later

161. Ans. (d) All of the above *[Ref. Park 23/e p501]*

162. Ans. (c) Levonorgestrel only pill *[Ref. Research on Reproductive Health at WHO, Biennial Report 2000-2001 Chapter1]*

Review Question

163. Ans. (a) Norgestrel *[Ref. Park 23/e p501]*

STERILIZATION

164. Ans. (d) Eight weeks [correct answer is three months] *[Ref. Park 23/e p509]*

165. Ans. (b) Surgical failure *[Ref. Park 23/e p509]*

166. Ans. (a) Female sterilization *[Ref. K. Park 23/e p508]*

167. Ans. (a) 0.1-0.5% *[Ref. Dutta's Obstetrics, 7/e p558]*

168. Ans. (b) From 24 hours to 7 days of delivery *[Ref. Standards for Female and Male Sterilization Services, MOHFW, GOI, p6]*

Surgical Procedure Timings for Female Sterilization (GOI)

- Interval sterilization: Within 7 days of the menstrual period (in the follicular phase of the menstrual cycle).
- Post-partum sterilization: After 24 hours up to 7 days of delivery
- Sterilization with medical termination of pregnancy (MTP): Performed concurrently
- Sterilization following spontaneous abortion: Performed provided the client fulfils the medical eligibility criteria

Also Remember

- Laparoscopic tubal ligation should not be done concurrently with second-trimester abortion and in the post-partum period

MISCELLANEOUS (FAMILY PLANNING AND CONTRACEPTION)

169. Ans. (b) OCPs protect against Candidiasis *[Ref. Shaw's Textbook of Gynaecology, 14/e p208; Park 23/e p502]*

- *Oral pills are associated with monolial vaginitis* (*candidiasis*)

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Also Remember

- *IUDs and Actinomycosis*: Actinomyces is a normal commensal of vagina. In presence of an IUD, it can cause an *'ascending Infection'* through threads of the device.
  - *If actinomycosis occurs in a female with IUD-in-situ*: Remove IUD and cut and send its threads for culture; Antibiotics should be given to control the infection.

170. Ans. (b) Combined oral pills *[Ref. Shaw's Textbook of Gynaecology, 14/e p208-09; Park 23/e p502]*

- *Increased incidence of ectopic is associated with*:
  - Previous salpingitis due to STD (MCC)
  - Congenital defects ion fallopian tubes
  - Transperitoneal migration of fertilized ovum to other side tube
  - Pelvic abnormalities
  - Tubal reconstructive surgery
  - Tubectomy operation
  - In-vitro fertilization
  - Rapid development of trophoblast
  - Extraneous events like appendicitis & endometriosis
  - IUDs (Progestagen containing IUDs have 9-fold higher risk)
  - Induction of ovulation by gonadotropins
  - Others: advancing age, smoking ,vaginal douching, exposure to diethylstilbestrol (DES) in utero
- *Combined oral pills lead to reduced incidence of ectopic pregnancy*, due to
  - Suppression of ovulation
  - Reduction in PID

Also Remember

- *MC type of ectopic pregnancy*: Tubal pregnancy (Fallopian Tubes)
- *MC site of implantation*: Ampulla (tubal pregnancy)
- *Threshold of discrimination of intrauterine pregnancy*: 1500 IU/ml of a-hCG
- *Cullen's sign can indicate a ruptured ectopic pregnancy*
- *Non-surgical treatment of ectopic pregnancy:* Methotrexate

171. Ans. (a) Vasectomy *[Ref. Park 23/e p509]*

- *Sterilization is the most cost-effective contraceptive measure*
  - Cost wise ratio is 5 vasectomies to 1 tubectomy

Also Remember

- *No Scalpel Vasectomy* (*NSV*): vas is brought out through a tiny puncture which does not require any stitches
  - Also known as *'Key hole vasectomy'*
  - Surgical hook (not scalpel) is used to enter the scrotum
  - New safer, convenient technique acceptable to males
  - Nearly painless, less invasive and faster

172. Ans. (c) Require action at time of intercourse *[Ref. Park 23/e p494]*

- *Conventional Contraceptives*: Methods that require action at the time of coitus
  - Condoms
  - Spermicides
  - Jellies
- *Conventional Contraceptives does not mean older contraceptives*

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Also Remember

- *Oldest methods of contraception* (*aside from sexual abstinence*):
  - coitus interruptus
  - lactational
  - certain barrier methods
  - herbal methods (ammenagogues and abortifacients)

173. Ans. (a) Achieve 100% institutional deliveries *[Ref. Park 23/e p493]*

Also Remember

Key ANC–Related Findings of NFHS – 3, India (2005 – 06)

- *MC health problem experienced in pregnancy*: Excessive fatigue (48%)
- *AN Care provided by doctor*: 50% (By none: 23%)
- *No. of AN visits* (> 4): 37%
- *Took IFA*: 65% (Took IFA for 90 days or more: 23%)
- *Received* > 2 *TT injections*: 76%
- *Home delivery*: 61% (Delivery at health facility: 39%)
- *Delivery conducted by a skilled provider*: 47%

174. Ans. (a) To bring down Total Fertility Rate (TFR) to replacement levels by 2015 *[Ref. Park 23/e p493]*

175. Ans. (a) Condom *[Ref. Park 23/e p494]*

- *Condom fatigue*: Is a term used by medical professionals and safer sex educators to refer to the phenomenon of decreased condom use
  - Also be used to describe a general weariness of and decreased effectiveness of safer sex messages (*prevention fatigue*)
  - The term has particularly been used to describe men who have sex with men (MSM), though the term applies to people of all genders and sexual orientations
  - Condom fatigue has been partially blamed for an increase in HIV infection rates, though this has not been substantiated in any study

Also Remember

- *Male contraceptives under trials*:
  - *Gossypol* (Chinese cotton derivative; research suspended due to 10-20% permanent azoospermia)
  - *Reversible inhibition of sperm under guidance* (*RISUG*) consists of injecting 'styrene maleic anhydride in dimethyl sulfoxide' into the vas deferens and leads to long lasting sterility (Phase III trial)
  - *Vas-occlusive contraception* consists of partially or completely blocking the vas deferens, the tubes connecting the epididymis to the urethra (intra-vas device IVD and other injectable plugs)
  - *Heat-based contraception*: heating the testicles to high temperature for a short period of time to prevent the formation of sperm.
  - *Adjudin*: A non-toxic analog of 'lonidamine' disrupts the junctions between nurse cells (Sertoli cells) in the testes and forming spermatids; the sperm are released prematurely and never become functional gametes
  - *A male hormonal contraceptive combination protocol* has been developed, involving injections of Depo-Provera to prevent spermatogenesis, combined with the topical application of testosterone gel to provide hormonal support
  - *Interference with the maturation of sperm in the epididymis* (under research)

176. Ans. (a) 20 weeks *[Ref. Park 23/e p506]*

Medical Termination of Pregnancy Act, 1971

- *Passed in*: April 1972
- *Indications for MTP*:
  - *Humanitarian*: If pregnancy is as a result of rape/sexual assault
  - *Eugenic*: Any genetic/ chromosomal anomaly detected in fetus
  - *Therapeutic*: If carrying out full term pregnancy poses a risk to life of mother
  - *Social*: If pregnancy is a result of contraceptive failure

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- *Written consent of guardians*:
  - If woman is a lunatic
  - If woman is less than 18 years age
- *Period of gestation must be 'less than 20 weeks'*:
  - 0 – 12 weeks: Opinion of one doctor is sufficient
  - 12 – 20 weeks: Opinions of 2 doctors required
- *Who can perform MTP*:
  - *Qualification*: MD (Gyn-Obs) or DGO or 6-months Housemanship in Gyn-Obs
  - *Experience*: Atleast carried out 20 – 25 supervised MTPs
- *Where MTP can be done*: At a place authorised by Government of India

177. Ans. (c) Oral contraceptive pills *[Ref. RCH- II Programme document]*

- Contraceptive choices for a newly married healthy couple
- *Barrier method:*
  - Has a high failure rate; only consistent use for 2 years reduce it
  - Has advantage of HIV/STI protection but a 'healthy' couple may not need it
- *IUCD*
  - Is not a method of first choice for nulliparous female
- *Oral contraceptive pills*
  - Low failure rate
  - Ideal method of choice for newly married healthy couple
- *Natural methods*
  - Has a high failure rate

178. Ans. (d) All of the above *[Ref. K. Park 21/e p778, Park 22/e p772]*

Uses of Regular Reporting of Health Statistics

- To measure health staus of population
- To quantify health related problems
- To evaluate trends of disease in a population
- To compare health data locally, nationally and internationally
- To effective plan health programs, policies, services
- To monitor and evaluate health programs
- To evaluate satisfaction among population
- To appreciate health personnel's efforts
- To promote epidemiological research

179. Ans. All Choices *[Ref. K. Park 23/e p57, 488]*

- *Mid-year population is used as denominator in*:
  - Crude birth rate
  - Crude death rate
  - Disease specific death rate
  - Sex specific death rate
  - Age specific death rate
  - Weekly death rate
  - General fertility rate
  - General marital fertility rate
  - Age-specific fertility rate
  - Age-specific marital fertility rate

180. Ans. (b) IUCD *[Ref. Post-puerperal Cu-T insertion: A prospective study. J Postgrad Med. 1989; 35:70-73]*

WHO Guidelines for Contraceptive use in Lactating Women

- Progestin-only methods of contraception (i.e., oral contraceptives, levonorgestrel-IUDs, levonorgestrel implant, Depo-Provera injection) are not usually recommended before 6 weeks postpartum unless other more appropriate methods are not available or not acceptable
- Progestin-only methods can be used in any circumstances after 6 weeks postpartum
- Combined estrogen-progestin contraceptives (i.e., oral contraceptives, transdermal path, or vaginal ring) are not to be used before 6 weeks postpartum

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- Combined estrogen-progestin contraceptives are not usually recommended between 6 weeks and 6 months postpartum unless other more appropriate methods are not available or not acceptable
- Combined estrogen-progestin contraceptives can be generally used after 6 months postpartum

An IUD is an ideal contraceptive for lactating women because it has no effect on the quality or composition of breast milk

- A post-partum IUD is generally inserted 6-8 weeks after delivery
- IUD is an effective method for long term contraception

181. Ans. (a) Barrier methods *[Ref. K. Park 23/e p494]*

- Ideal contraceptive for a couple who are living separately in two cities and meets only occasionally is Condom as long term contraception is not desirable
  - Also OCPs, Barrier methods are required for long term contracetion and both of them have few side effects too; so they are not desirable in this case
  - Inj. DMPA is an injectable (DEPOT) hormonal formulation which given contraception for 3 months which is not desirable here.

182. Ans. (a) OCP *[Ref. K. Park 23/e p500]*

183. Ans. (a) Wife only *[Ref. MTP Act, GoI]*

Consent Under MTP Act, 1972

- *If pregnant female is 18 years or above*: Consent of woman alone is required
- *If pregnant female is less than 18 years*: Consent of guardian is required
- *If pregnant female is lunatic*: Consent of guardian is required

Also Refer to Ans. 173

184. Ans. (c) 30-35% *[Ref. Human Reproductive Biology by Lopez & Jones, 4/e p286]*

185. Ans. (b) 1977 *[Ref. Indian Economy by TR Jain , 2010-11/e, p400]*

Review Questions

186. Ans. (d) Diaphragm *[Ref. Park 23/e p495]*

187. Ans. (b) Nonoxynol *[Ref. Park 23/e p495]*

188. Ans. (c) None *[Ref. Park 23/e p506]*

189. Ans. (a) Vasectomy *[Ref. Park 23/e p509]*

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CHAPTER

8

Preventive Obstetrics, Paediatrics and Geriatrics

MCH

I *Minimum recommended ante-natal visits*[Q]: 4

Ante-natal and Post-natal Visits (RCH Program)

- *Ideal recommended ante-natal visits*[Q]: *13 – 14*

Period of gestation	Frequency of visit[Q]
0 – 7 months	Once every month
8th month	Twice a month
9th month onwards	Once a week

- *Minimum recommended ante-natal visits*[Q]: 4

Visit	Period of gestation[Q]
First AN visit	Early registration
Second AN visit	14-26 weeks POG
Third AN visit	28-34 weeks POG
Fourth AN visit	36 weeks POG - Term

I *Minimum recommended post-natal visits*[Q]: 3

- Minimum recommended post-natal visits[Q]: 3

Visit	Period of gestation
First PN visit	<3 days
Second PN visit	1 week
Third PN visit	8 weeks

At Risk Approach

- *At risk approach*: Central purpose is to identify high risk cases (as early as possible) from a large group of all antenatal mothers/infants, and *provide specialized care* to them, *while continuing to provide appropriate care to all antenatal mothers/infants*[Q]
- *At risk infants*: Contribute to perinatal, neonatal and infant mortality; so they have to be provided with special intensive care; Basic criteria for identifying these babies include[Q]:
  - Birth weight < 2.5 kg (low birth weight)
  - Twins
  - Birth order > 5
  - Artificial feeding
  - Weight < 70% of expected (II and III degrees of malnutrition)
  - Failure to thrive (failure to gain weight in 3 successive months)
  - Children with PEM, diarrhea
  - Working mother/single parent
- *At risk mothers*[Q]: Basic criteria for identifying these mothers include:
  - Elderly primi (> 30 years)[Q]
  - Short statured primi (< 140 cm)[Q]
  - Malpresentations (breech, transverse lie, etc.)
  - Antepartum hemorrhage, threatened abortion
  - Preeclampsia, Eclampsia
  - Anemia
  - Twins, hydramnios
  - Previous still birth, IUD, manual removal of placenta
  - Elderly grandmultipara (≥ 5 parity)[Q]

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- Prolonged pregnancy (> 14 days after EDD)
- History of previous CS or instrumental delivery
- Pregnancy associated with general diseases (diabetes, TB, etc.)

- *Danger signals during labour*: Basic criteria for identifying these mothers (so that they can be transferred to nearest PHC) include[Q]:
  - Sluggish or no pains after rupture of membranes
  - No progress after rupture of membranes (only good pains for 1 hour)
  - Prolapse of hand or cord
  - Meconium stained liquor or slow irregular or fast fetal heart sound
  - Excessive show or bleeding during labour
  - Collapse during labour
  - Placenta not separated within half hour after delivery[Q]
  - PPH or collapse
  - Temperature > 38° C

I
Pregnancy[Q]
+ 350 Kcal

I
Lactation
First 6 months[Q]
+ 600 Kcal

Nutritional Requirements

- *Recommended daily energy intake*: [NEW GUIDELINES 2011]

Group	Energy Allowance per day (Kcal)
Infancy	
0-6 months[Q]	92 Kcal/kg/day
6-12 months[Q]	80 Kcal/kg/day
Adult Reference Male (Wt: 60 kg)	
Sedentary/Light work[Q]	2320
Moderate Work	2730
Heavy Work	3490
Adult Reference Female (Wt: 55 kg)	
Sedentary/Light work[Q]	1900
Moderate Work	2230
Heavy Work	2850
Pregnancy[Q]	+ 350
Lactation	
First 6 months[Q]	+ 600
6-12 months	+ 520

(+ indicates *'over and above the daily requirement'*)

- *Requirements in pregnancy and lactation*:

Group	Requirement per day	
	Energy (Kcal/day)[Q]	**Proteins (g/day)**
Woman		
Sedentary work[Q]	1900	55
Moderate work	2230	55
Heavy work	2850	55
Pregnancy[Q]	+ 350	+23
Lactation		
0 – 6 months[Q]	+600	+19
6 – 12 months	+520	+13

(+ indicates *'over and above the daily requirement'*)

- *Other requirements in pregnancy and lactation*:

	Pregnancy	Lactation	
		0 – 6 months	6 – 12 months
Proteins	+23 g/day[Q]	+19 g/day	+13 g/day
Calcium	1200 mg/day[Q]	1200 mg/day[Q]	1200 mg/day
Iron	35 mg/day[Q]	21 mg/day	21 mg/day
Vitamin A	800 mcg/day[Q]	950 mcg/day	950 mcg/day

(+ indicates *'over and above the daily requirement'*)

I
Five cleans
Clean delivery surface
Clean hands (of birth attendants)
Clean cord cut (blade or instrument)
Clean cord tie
Clean cord stump

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Cleans of Safe Delivery

- *'Five cleans'* (practices) under strategies for elimination of neonatal tetanus include[Q],
  - *Clean delivery surface*
  - *Clean hands (of birth attendants)*
  - *Clean cord cut (blade or instrument)*
  - *Clean cord tie*
  - *Clean cord stump (no applicant)*
- *Procedures undertaken to ensure 5 cleans*:
  - *Clean delivery surface:* A clean plastic sheet
  - *Clean hands:* Soap and clean water
  - *Clean cord cut:* A new razor blade
  - *Clean cord tie:* A clean piece of thread
  - *Clean cord stump:* Nothing to be applied to cord
- Sometimes these practices are called as *'3 cleans'*:
  - *Clean delivery surface*
  - *Clean hands*
  - *Clean cord care (cut, tie and stump)*
- Suggested *'Seven cleans'*[Q] (include five cleans)
  - *Clean delivery surface*
  - *Clean hands (of birth attendants)*
  - *Clean cord cut (blade or instrument)*
  - *Clean cord tie*
  - *Clean cord stump (no applicant)*
  - *Clean water, and*
  - *Clean towel, for hand washing*

IFA Tablets

I *Adult tablet of IFA contains[Q]: 100 mg elemental Iron and 500 mcg Folic acid*

- *An adult tablet of IFA contains[Q]:* 100 mg elemental Iron and 500 mcg Folic acid (to be given for 100 days minimum in pregnancy)
  - Schedule: 1 Tablet per day in 4-5-6 month POG (Total 100 tablets)
- *A pediatric tablet of IFA contains[Q]:* 20 mg elemental Iron and 100 mcg Folic acid (to be given for 100 days minimum every year till 5 years age of child)

TT in Pregnancy

Refer to Chapter 3, Theory

Mother to Child Transmission (MTCT)

Refer to Chapter 5, Theory

Birth Weight

I *Single best measure to assess physical growth: Weight*

- Birth weight of an infant is the *'single most important determinant of its chances of survival, healthy growth and development'*[Q]
- *Single best measure to assess physical growth:* Weight[Q]
- *Birth weight preferably be measured within:* 1st hour of life[Q]
- *Average birth weight in India:* 2.8 kg (2.7 – 2.9 kg) [Q]
- *Majority of LBW in India is due to:* Maternal malnutrition associated with fetal growth retardation
- *Relationship between maternal nutrition and birth weight of babies:* Linear[Q]
- *Smoking during pregnancy reduces birth weight by an average:* 170 grams
- *LBW is not a contraindication for any vaccination EXCEPT Hepatitis B:* Hepatitis B vaccine is contraindicated in preterm children with birth weight <2.0 kg[Q]
- *Field instrument for measurement of birth weight:* Salter's Scale[Q]

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- *Growth chart is plotted between:* Weight and Age[Q]
- Birth weight doubles at 5 months age, triples at 1 year and quadruples at 2 years age[Q]
- *Birth weight increments:*

Age	Weight increments
0 – 3 months	200 grams per week
4 – 6 months	150 grams per week
7 – 9 months	100 grams per week
10 – 12 months	50 grams per week
1 – 2 years	2.5 kg per year
3 – 5 years	2.0 kg per year

Low Birth Weight (LBW)

- *Low Birth Weight (LBW)* [Q]*:* Birth weight less than 2500 grams (<2.5 kg) [WHO]. It includes both pre-term (<37 weeks POG) and full-term (>37 weeks POG) babies
- *Prevalence of LBW:* 15% (World); 28% (*India*[Q])
  - *If cutoff for LBW is reduced to 2.0 kg*, expected prevalence of LBW in India will be 5.5%[Q]
- *LBW is regardless of gestational age*[Q]
- Depending on the population, the percetntage of LBW be based on measurements of atleast 500 babies[Q]
- *3 inter-related risk factors for LBW:* Malnutrition, Infection and Unregulated fertility
- *Goal for LBW in National Health Policy 1983:* Reduce LBW to <10% by 2000[Q]
- *Babies according to gestational age:*

Type	Gestational age[a]
Pre-term babies	< 37 weeks (< 259 days)
Term babies	37 – 42 weeks (259 – 293 days)
Post-term babies	> 42 weeks (> 294 days)

- *Low birth weight:'Less than 2500 grams IRRESPECTIVE of gestational age'*
- *Pre-term babies:* Born at < 37 weeks POG
- *Small-for-date (SFD) babies*[Q]*:* Born at term or post-term
  - weigh *'less than 10th percentile for gestational age'*[Q]
  - as a result of IUGR[Q]
  - high risk of dying in neonatal and infancy period

I *(LBW)*[Q]*: Birth weight less than 2500 grams (<2.5 kg)*

MCH INDICATORS

Infant Mortality Rate (IMR)

- *Infant mortality rate (IMR):* Is the ratio of infant deaths registered in a given year to the total number of live births registered in the same year; IMR is usually expressed as a rate per 1000 live births (LB)[Q]

$$\text{IMR} = \frac{\text{No. of infant deaths in a given year}}{\text{Total no. of live births in the same year}} \times 1000$$

- *Infant Mortality Rate (IMR) is the SECOND best indicator of socio-economic development of a country*[Q]
  - *Best indicator of SE development*[Q]*:* Under 5 mortality rate (U5MR)
- *IMR is most important indicator of*
  - health status of a community
  - level of living and
  - effectiveness of MCH services in general

I *IMR is usually expressed as a rate per 1000 live births (LB)*[Q]

I *MCC of IMR in India: Low birth weight and prematurity*[Q]

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- The infant mortality rate is among *'the best predictors of state failure'*[Q]
- Infant Mortality Rate (IMR):
  - *Infant Mortality Rate (IMR) is a rate*
  - Infant mortality accounts for 18% of total deaths in India
  - *MCC of IMR in India:* Low birth weight and prematurity[Q]
  - *MCC of IMR in World:* Pneumonia[Q]
- *IMR (India):* 40 per 1000 LB [54 MP/Assam; 09 Goa]
- *IMR (World):* 42 per 1000 LB (Monaco: 1.8; Afghanistan: 122) [2012]
- *Goal in National Population Policy 2000*[Q]*:* 30 per 1000 LB by 2010

Factors Affecting IMR

- Likely factor affecting infant mortality in contemporary India is inadequate prenatal care and infrequent attendance at delivery
- *Factors affecting Infant Mortality Rate (IMR):*
  - *Biological factors:*
    - *Birth weight (BW)*: IMR greater in BW < 2.5 kg and > 4.0 kg
    - *Age of mother*: IMR is greater in age < 19 and > 35 years
  - *Birth order*: Infant mortality is greatest for birth order 1 and least for 2; It increases from birth order 3 onwards[Q]
    - *Birth spacing*: IMR reduces with wider birth spacing
    - *Multiple births*: IMR increases in multiple births
    - *Family size:* IMR increases as family size increases
    - *High fertility:* IMR increases with high fertility
  - *Economic factors:*
    - *Socio-economic status (SES):* IMR higher in lower SES
  - *Cultural and social factors:*
    - *Breast feeding:* IMR higher in early weaning and bottle fed infants living in poor hygienic conditions
    - *Religion and caste:* IMR is affected by patterns, habits, customs, child care, etc
    - *Early marriages:* IMR higher in teen age pregnancy
  - *Other factors:*
    - *Sex of the child:* IMRgirls > IMRboys[Q]
    - *Quality of mothering:* IMR low in good quality of mothering
    - *Quality of health care:* IMR high in improper obstetric and pediatric care
    - *Maternal education:* IMR low in mother with high literacy rate
    - *Broken family:* IMR higher
    - *Illegitimacy:* IMR higher
    - *Brutal habits and customs:* IMR high (Not feeding colostrum, applying cow-dung to umbilical-stump, faulty feeding practices)
    - *Untrained dai:* High IMR
    - *Bad environmental sanitation:* High IMR

Neonatal Mortality Rate (NNMR)

- *Neonatal mortality rate (NNMR):* Is the number of neonatal deaths (deaths within completed 28 days after birth) per 1000 live births in that year[Q]

$$\text{NNMR} = \frac{\text{No. of neonatal deaths in a given year}}{\text{Total no. of live births in the same year}} \times 1000$$

  - *Early neonatal mortality (ENNM):* Neonatal mortality in first week (1-7 days) of life[Q]
  - *Late neonatal mortality (LNNM):* Neonatal mortality in first to fourth week (8 – 28 days) of life
- *NNMR (India): 29* per 1000 LB [2014] [Q]
- *NNMR is directly related with birth weight and gestational age*

I

MCC of NNMR in India is preterm birth

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- NNMRboys > NNMRgirls[Q]
- *MCC of NNMR in India is preterm birth*
  - *MCC of ENNMR:* Prematurity and congenital anomalies[Q]
  - *MCC of LNNMR:* Infections (diarrhea and tetanus)[Q]
- *Causes of Neonatal mortality (0 – 4 weeks):*
  - Low birth weight and prematurity
  - Birth injury and difficult labour
  - Sepsis
  - Congenital anomalies
  - Hemolytic diseases of newborn
  - Conditions of placenta and cord
  - Diarrhoeal diseases
  - Acute respiratory infections
  - Tetanus

Maternal Mortality Ratio (MMR)

- *Maternal Mortality Ratio (MMR): Maternal deaths expressed as per 100,000 live births, where a 'maternal death'* is defined as 'death of a woman while pregnant or during delivery or within 42 days (6 weeks) of termination of pregnancy, irrespective of duration or site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes'[Q]
  - *Maternal deaths expressed as per 100,000 live births* (earlier it was expressed per 1000 live births but that yielded fractions like 4.08 maternal deaths per 1000 LB; so denominator was extrapolated to 100,000 to make MMR value more sensible) [Q]
  - *MMR is a ratio*[Q]

$$\text{MMR} = \frac{\text{No. of maternal deaths in a given year}}{\text{Total no. of live births in the same year}} \times 100{,}000$$

- *MMR World:* 210 per 100,000 live births; *Causes of MMR (globally):*
  - *Hemorrhage (25%)*[Q]
  - *Indirect causes (20%)*
  - *Infection (15%)*
  - *Unsafe abortion (13%)*
  - *Eclampsia (12%)*
  - *Obstructed labour (8%)*
- *MMR India:* 167 per 100,000 live births [2014][Q]; *Causes of MMR (India) [SRS 2001-03]:*
  - *Hemorrhage (38%)*[Q]
  - *Other conditions (34%)*
  - *Sepsis (11%)*
  - *Abortion (8%)*
  - *Obstructed labour (5%)*
  - *Hypertensive disorders (5%)*
- *Millennium Development Goal (MDG) as:* Reduce maternal mortality by three-fourths by 2015
- *RHIME*[Q] *- 'Representative, re-sampled, routine household interview of mortality, with medical evaluation': Is a new method for MMR estimation* introduced in India from 2003 SRS
  - RHIME is an enhanced form of *verbal autopsy*[Q]

I (MMR): Maternal deaths expressed as per 100,000 live births

I MMR is a ratio

Maternal Mortality Rate

- *Maternal mortality rate (MMRate):* Dividing the average annual number of maternal deaths in a population by the average number of women of reproductive age (typically those aged 15 to 49 years) who are alive during the observation period

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- MMRate reflects not only the risk of maternal death per pregnancy or per birth, but also the level of fertility in a population

Child Mortality Rate, CMR (Under 5 mortality rate, U5MR)

$$\text{CMR} = \frac{\text{No. of deaths of children less than 5 years age in a year}}{\text{No. of live births in a year}} \times 1000$$

- *U5MR (India):* 52 per 1000 LB [2014]Q
- *U5MR (World):* 43 per 1000 LB [2015]
- *Single MCC of U5MR or CMR is Pneumonia (19%)* [diarrhoea – 17%; malaria – 8%]Q
- *Neonatal conditions lead to 37% of total U5MR or CMR*Q*:*
  - Infections (MC neonatal condition leading to U5MR)
  - Preterm births
  - Asphyxia

Child Death Rate, CDR (1 – 4 year Mortality Rate)

$$\text{CDR} = \frac{\text{No. of deaths of children aged 1—4 years in a year}}{\text{Mid year population of children aged 1—4 years}} \times 1000$$

- *CDR is a more refined indicator of social situation in a country than infant mortality*
- *Highest risk of death in 1 -4 years age:* 2nd year of life
- *CDR (India):* 2.8% of total deaths [2014]Q
- *MCC CDR (Developing countries):* Diarrhoel diseases and respiratory infectionsQ
- *MCC CDR (Developed countries):* Accidents
- *Millennium Development Goal (MDG) 4:* Reduce child mortality by two-thirds by 2015
- UNICEF considers U5MR or CMR as *'single best indicator of socio-economic development and well being'*Q

Child Survival Rate (CSR) [Child Survival Index]Q

$$\text{CSR} = \frac{1000 - \text{U5MR}}{10}$$

- *CSR (India)*: 94.8 [2014]

Post Neonatal Mortality Rate (PNNMR)

- *Post-neonatal mortality rate (PNNMR):* Is the number of infant deaths after Neonatal period (deaths within completed 28 days after birth) per 1000 live births in that yearQ

$$\text{PNNMR} = \frac{\text{No. of deaths between age 28 days to 1 year in a given year}}{\text{Total no. of live births in the same year}} \times 1000$$

Perinatal Mortality Rate (PNMR)

- *Perinatal Mortality rate (PNMR)*: Includes both late fetal deaths (stillbirths) and early neonatal deathsQ

$$\text{PNMR} = \frac{\text{Late fetal deaths and early neonatal deaths in a given year}}{\text{Total no. of live births in the same year}} \times 1000$$

- Perinatal period is from 28 weeks period of gestation to 7th completed days of life (But the *WHO definition of perinatal period* is from 22 completed weeks gestation to 7th completed days of lifeQ)
  - PNMR is the sum of the fetal mortality and the neonatal mortality

I Perinatal period is from 28 weeks period of gestation to 7th completed days of life

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- *PNMR is a major marker to assess the quality of health care delivery*[Q]
- *PNMR (India): 28 per 1000 LB* [2014]
- *P List*[Q] *(ICD 10):* 100 causes of perinatal mortality and morbidity

BREAST FEEDING

I *Exclusive breast feeding till 6 months age*[Q]

WHO Guidelines for India

- WHO recommends, in developing countries, *exclusive breast feeding till 6 months age*[Q]
- WHO recommends, in developing countries, *breast feeding till minimum 2 years age*[Q]

I *Energy content of breast milk: 65 Kcal/ 100 ml*
Protein content of breast milk: 1.1 grams/ 100 ml

Nutritional Importance of Breast-milk

- *Energy content of breast milk:* 65 Kcal/ 100 ml[Q]
- *Protein content of breast milk:* 1.1 grams/ 100 ml[Q]
- *Mean output of breast milk per day (ml):*

Months of lactation	Mean output (ml)
0 – 2	530
3 – 4	640
5 – 6	730[a]
7 – 8	660
9 – 10	600
11 – 12	525

- *Nutritive values of milk (per 100 gm):*

	Cow's milk	Human milk
Lactose (g)	4.4	7.4
Proteins (g)	3.2	1.1
Fat (g)	4.1	3.4
Calcium (mg)	120	28
Iron (mg)	0.2	0.35
Water (g)	87	88
Energy (Kcal)	67	65

- *Human Milk is richer in Carbohydrate (lactose), Iron and Water content* WHILE Cow's milk is richer in Fat, Protein, Calcium and energy content[Q]
  - *Human milk proteins:* More cystine and taurine; less methionine; better digested than cow's milk proteins[Q]
  - *Human milk fats:* Higher levels of PUFAs, esp., linoleic acid and -linoleic acid; better digested and absorbed; low calcium content but better absorbed than cow's milk[Q]
  - *Human milk vitamins and minerals:* Human milk is richer in Vitamin A, C; richer in copper, cobalt and selenium; richer in iron and higher bioavailability; high calcium/phosphorus ratio; Human milk has lesser sodium[Q]
- *Comparative contents of nutrients in different types of milk:*
  - *Fat content of milk:* Buffalo > Goat > Cow > Human
  - *Protein content of milk:* Buffalo > Goat > Cow > Human
  - *Energy content of milk:* Buffalo > Goat > Cow > Human
  - *Lactose content of milk*[Q]*:* Human > Buffalo > Goat > Cow

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Colostrum

- Is the most suitable food immediately after birth of the baby; Regular milk comes 3-6 days after birth
- Also known as '*Beestings*', '*First milk*' or '*Immune Milk*'[Q]
- High in carbohydrates, protein, and antibodies and low in fat
- Contains all five immunoglobulins found in all mammals, IgA, IgD, IgE, IgG and IgM[Q]
- *Few occassions when breast feeding might harm the infant*[Q]*:*
  - Infants with classic galactosemia
  - Mother has untreated pulmonary tuberculosis
  - Mother is taking certain medications that suppress the immune system
  - Mother has had unusually excessive exposure to heavy metals such as mercury
  - Mother has HIV
  - Mother uses potentially harmful substances such as cocaine, heroin, and amphetamines

I *'Underweight' (Acute + Chronic Malnutrition)*

GROWTH AND DEVELOPMENT

Indicators of Malnutrition

- *Indicators of malnutrition:*
  - *Single best parameter for assessment of physical growth:* Weight (and rate of weight gain)[Q]
  - *Single most sensitive measure of growth:* Weight[Q]
  - *Single most reliable criterion of assessment of health and nutritional status:* Weight[Q]
  - *Weight for height is considered more important than weight alone,* for the measurement of physical growth
  - Height is a stable measurement of growth as opposed to body weight[Q]
  - *Weight:* Reflects only present health status
  - *Height:* Indicates events in past also
- *Acute and Chronic Malnutrition*[Q]*:*
  - *Low weight for age:* Is known as '*Underweight*'[Q] (Acute + Chronic Malnutrition[Q])
  - Low weight for height: Is known as 'Nutritional wasting'[Q] or 'Emaciation' (Acute Malnutrition[Q])
  - *Low height for age:* Is known as *'Nutritional stunting'*[Q] or *'Dwarfing'* (Chronic malnutrition[Q])
- *Age independent parameters for growth assessment:*
  - Weight for height
  - Mid arm circumference (MAC)
  - Thickness of subcutaneous fat
  - Body ratios
  - Weight : Height
  - MAC : Head circumference
- *Gomez Classification of malnutrition: Is based on 'weight for age'*

I *Wasting (Acute Malnutrition*[Q]*)*

I *Stunting (Chronic malnutrition*[Q]*)*

Weight for age*	Grade of malnutrition
90 – 110%	Normal
75 – 89%	1st degree (MILD)
60 – 74%	2nd degree (MODERATE)
< 60%	3rd degree (SEVERE)

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- *Waterlow classification:*

Weight/ height	> Mean – 2SD	< Mean – 2SD
Height/ age		
> Mean – 2SD	Normal	Wasted
< Mean – 2SD	Stunted	Wasted & Stunted

Milestones of Development[Q]

Age	Motor development	Language development	Adaptive development	Socio-personal development
6-8 wks	–	–	–	look/smiles at mother
3 m	holds head erect	–	–	
4-5 m	–	listening	reach for objects	recognizes mother
6-8 m	sits without support	experiment with noises	hand-transfer object	enjoys hide & seek
9-10 m	crawls	increase sound-range	releases objects	stranger suspicion
10-11 m	stands with support	first words	–	–
12-14 m	walks wide base	–	builds	–
18-21 m	walks narrow base	joining words	begins to explore	–
24 m	runs	short sentences	–	dry by day

Birth Weight

- *Average birth weight in India:* 2.8 kg (2.7 – 2.9 kg)[Q]
  - *Low Birth Weight (LBW):* BW < 2.5 kg[Q]
  - *LBW in India:* 28%[Q]
- *BW doubles at 5 months, triples by 1 year and quadruples by 2 years age*[Q]
  - *Minimum expected weight gain per month:* 500 grams
- *Weight gain pattern in children:*

I *LBW in India: 28%*
BW doubles at 5 months, triples by 1 year

Age	Weight increments
0 – 3 months	200 grams per week
4 – 6 months	150 grams per week
7 – 9 months	100 grams per week
10 – 12 months	50 grams per week
1 – 2 years	2.5 kg per year
3 – 5 years	2.0 kg per year

Birth Length/Height

- *Average birth length in India:* 50 cms[Q]
- *BL doubles at:* 4 years age[Q]
- *Height increase pattern in children:*

I *BL doubles at: 4 years age*

Age	Height increments
1st year	25 cm per year[Q]
2nd year	12 cm per year
3rd year	9 cm per year
4th year	7 cm per year
5th year	6 cm per year

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- *Near-final height attainment*[Q]*:*
  - Indian boys attain 98% of final height by 17.75 years
  - Indian girls attain 98% of final height by 16.5 years

Growth Charts

- *Growth Chart (Road-to-health chart):* Is a visible display of child's physical growth and development
  - *Growth chart was developed by:* David Morley[Q]
  - *Growth chart is designed for:* Longitudinal follow-up (growth monitoring) of a child
  - *Growth chart is generally plotted between:* Weight and Age[Q]
- *Growth chart provides information on*[Q]*:*
  - Identification and registration
  - Birth date and birth weight
  - Chronological age
  - Weight-for-age
  - Developmental milestones
  - History of sibling health
  - Immunization procedures
  - Introduction of supplementary foods
  - Episodes of sickness
  - Child spacing (Contraceptive/family planning methods used)
  - Reasons for special care

I *Growth chart was developed by: David Morley*

WHO Home Based Growth Chart

- *WHO growth chart has 2 reference curves*[Q]*:*
  - *Upper Reference Curve (URC):* 50th percentile for boys[Q]
  - *Lower Reference Curve (LRC):* 3rd percentile for girls
- *Road to Health:* Is the space between two growth curves (weight channel). It includes zone of normality for most populations, i.e. 95% of healthy normal children used as a reference fall in this area[Q]
- *WHO reference curves are based on*[Q]*:* NCHS Standards (National Centre for Health Statistics, USA)
  - *The 3rd percentile (LRC) corresponds to approximately 2 SD below the median of weight-for-age reference value (URC)*[Q]

I *WHO growth chart Upper Reference Curve (URC): 50th percentile for boys*

WHO Service Growth Chart

- *Has 5 reference curves:*
  - *97th percentile of standard* reference population
  - *50th percentile of standard* reference population
  - *3rd percentile of standard* reference population
  - *3rd SD value of standard* median population
  - *4th SD value of standard* median population

Government of India (GOI) recommended Growth Chart

- *GOI recommended growth chart has 4 reference curves:*
  - *80% of median* (50th percentile or URC) of WHO reference standard
  - *70% of median* (50th percentile or URC) of WHO reference standard
  - *60% of median* (50th percentile or URC) of WHO reference standard
  - *50% of median* (50th percentile or URC) of WHO reference standard
    - *The 80% of median corresponds to approximately 2 SD below the median of weight-for-age reference value (i.e, URC)*[Q]

I *WHO reference curves are based on: NCHS Standards*

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- *Interpretation of plot of weight on GOI recommended growth chart:*
  - *Between 80% and 70% lines:* 1st degree or Mild malnutrition
  - *Between 70% and 60% lines:* 2nd degree or Moderate malnutrition
  - *Between 60% and 50% lines:* 3rd degree or Severe malnutrition
  - *Below 50% line:* 4th degree or IV grade malnutrition

ICDS Growth Chart (Based on WHO MGRS Child Growth Standards 2006)

- *ICDS Growth chart has 3 reference curves*[Q]*:*
  - Reference standard
  - 2SD below of reference standard
  - 3SD below reference standard

Key Facts about Growth Charts

- Growth chart was first designed by *'David Morley'* (and later modified by WHO)
- Growth chart is the *'passport to child's health care'*[Q]
- *Best available standards of growth:* NCHS standards[Q]
- *Direction of growth in a growth chart is more important* than the position of dots
  - *Periodic weight record is more useful than a single weight plot*
- *Objective in child care:* To keep the child above 3rd percentile[Q]
- *Flattening of a child's plot:* indicates malnutrition
- During states of under-nutrition, weight, height and brain growth are affected in that order
- There are 49 types of growth charts used in India
- *Uses of growth chart:*[Q]
  - Growth monitoring tool
  - Diagnostic tool for identifying high risk children
  - Planning and policy making
  - Educational tool
  - Tool for action
  - Evaluation of corrective measures and impact of a programme
  - Tool for teaching
- *Reference or standard values of growth:*
  - Harvard (Boston) standards
  - NCHS standards (WHO reference values)
  - Indian standards (ICMR values)

I *Growth chart is the 'passport to child's health care'*

I *NRHM [New Guidelines] recommendation:* Once every 6 months[Q]

SCHOOL HEALTH

Health Disorders among School Children

- *Commonly detected morbidities in school children (in decreasing order of prevalence):*
  - Dental defects[Q] (180.3 per 1000)
  - Goiter (123.8 per 1000)
  - Malnutrition (123.5 per 1000)

School Health Examination

- In 1961, *'Rennuka Roy School Health Committee'* laid the foundations for a comprehensive school health programme in India
  - Recommendation: Medical examination of children *'at the time of entry and thereafter every 4 years'*
  - *NRHM [New Guidelines] recommendation:* Once every 6 months[Q]

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I Visual acuity cutoff for referral to PHC: < 6/9

- *School Eye Screening Programme:*
  - Focus on middle schools (V – VIII classes: 10 – 14 years age group)
  - Teachers to do screening: 1 teacher per 150 students[Q]
  - Visual acuity cutoff for referral to PHC: < 6/9[Q]

Healthful School Environment

I Desks of 'minus (–) type
Doors and windows area > 25% of floor area

- *Healthful school environment:* Suggested minimum standards for sanitation of schools and its environs in India include,
  - *Location:* Away from noisy surroundings; kept fenced
  - *Site:* 5 acres for primary schools; 10 acres for higher elementary schools
  - *Structure:* Exterior walls 10 inch thick and heat resistant
  - *Class room:* 1 class room per 40 students maximum[Q]
  - *Per capita space:* >10 sq. feet[Q]
  - *Furniture:* Single desks of 'minus (–) type'[Q]
  - *Doors and windows:* Doors and windows area > 25% of floor area[Q]
  - *Color:* Inside color of walls should be white
  - *Lighting:* Natural light from left side
  - *Water supply:* Safe and potable and continuous supply through taps
  - *Lavatory:* 1 urinal per 60 students and 1 latrine per 100 students[Q]

ICDS, IMNCI, BFHI

Ten Steps to Successful Breast Feeding (WHO-UNICEF and BFHI 1991 Baby Friendly Hospital Initiative[Q]): Every facility providing maternity services and care to the newborn infants should, **[MNEMONIC: SERENDIPITY]**

I 1 urinal per 60 students and 1 latrine per 100 students

- Have a written breast feeding **P**olicy that is routinely communicated to all health care staff
- **T**rain all health care staff in skills necessary to implement this policy
- **I**nform all pregnant women about benefits and management of breast feeding
- Help mother **I**nitiate breast feeding *'within half hour of birth'*
- **S**how mothers how to breast feed, and how to maintain lactation even if they are separated from their infants
- Give newborn infants no food or drink other than breast milk, unless medicall**Y** indicated
- *Practice **R**ooming-in:* Allow mothers and infants to remain together 24 hours a day
- Encourage *'breast feeding on **D**emand'*
- Foster **E**stablishment of breast feeding support groups and refer mothers to them on discharge from the hospital or clinic:
  - **E**liminate any support by the manufacturers of infant-formula/infant-food or feeding bottles
  - Prohibit distribution of free and low-cost supplies of breast milk supplies
  - Provide additional lactation assistance to mothers of special cases, i.e. low birth weight, caesarean section
  - Assure a safe and, healthy and positive birthing experience for mother and infant

Integrated Management of Neonatal and Childhood Illness (IMNCI)

Refer to Theory, Chapter 6

I *Heart of ICDS system:* Anganwadi

Integrated Child Development Services (ICDS)

- *Integrated Child Development Services (ICDS), 1975:* ICDS aims at providing services to pre-school children in an integrated manner so as to ensure proper growth and development of children in rural, tribal and slum areas
  - ICDS is one of the world's largest programmes for early childhood development[Q]

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- *ICDS is a centrally sponsored scheme*[Q]
- *ICDS provides an integrated package of services*[Q]*:*
  - Supplementary nutrition
  - Immunization
  - Health check-up
  - Medical referral services
  - Nutrition and health education for women
  - Non-formal education for children aged 3 – 6 years, and pregnant and nursing mothers in rural, urban and tribal areas
- *ICDS Beneficiaries (Irrespective of income of family)*[Q]
  - Children 0 – 6 years age
  - Pregnant and lactating mothers
  - Women in reproductive age group
  - Adolescent girls 11 – 18 years
- *Heart of ICDS system:* Anganwadi[Q]
- *Focal point for ICDS services delivery is Anganwadi Worker*[Q]*;* Each Anganwadi has 1 Anganwadi worker and 1 helper
  - 1 Anganwadi centre per 400–800 population in rural and urban projects[Q]
  - 1 Anganwadi centre per 300–800 population in tribal projects[Q]
  - 1 Mini-Anganwadi centre per 150 population
- *Supplemental nutrition given through ICDS:* 300 feeding days in a year [NEW 2014 GUIDELINES]

Category	Existing		Revised[Q]	
	Calories (Kcal)	Protein (g)	Calories (Kcal)	Protein (g)
Children (6-72 months)	300	8-10	500	12-15
Severely malnourished children (6-72 m)	600	20	800	20-25
Pregnant women and Nursing mothers	500	15-20	600	18-20

- *Administrative unit of ICDS: 'Community Development Block*[Q]*';* each project covering a population of 1,00,000 (rural/urban) or 35,000 (tribal)[Q]
  - 1 CDPO (Community Development Project Officer) is in charge of 4 supervisors *(Mukhyasevikas)* and 100 Anganwadis (each supervisor for 25 Anganwadis)
- *Kishori Shakti Yojana:* Scheme for adolescent girls in ICDS
- *ICDS in India:* Implementation by Ministry of Women and Child Development
  - ICDS projects sanctioned: 7073
  - Anganwadis functioning: 12.42 lacs
  - MiniAWCs: 1.13 lacs

Kishori Shakti Yojana (KSY)

- KSY is rename of 'Adolescent Girl's Scheme' under ICDS (Integrated Child Development Services) [Q]
- *Aim of KSY:*
  - To improve the nutritional and health status of adolescent girls
  - To promote self-development, awareness of health, hygiene, nutrition, and family life and child care
- KSY covers 2000 ICDS projects

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- *Options for interventions under KSY:*

Options for intervention	Activities
Adolescent girls scheme-I[Q] *'Girl-to-girl Approach'* 11 – 15 years old girls	- Preventive health, hygiene & nutrition education - Working on Anganwadi centre - Family life education - Participate in creative activities - Skill development or vocational training - Learn about significance of education & life skills, personal hygiene, environmental sanitation, nutrition, home nursing, first aid, communicable diseases, VPDs, family life, child care and development, constitutional rights & their impact on quality of life
Adolescent girls scheme-II[Q] *'Balika Mandals'* 11 – 18 years old girls	

NEONATAL SCREENING

Neonatal Screening

- *Neonatal Screening:* Secondary Level of Prevention
  - *MC neonatal disorder screened:* Neonatal hypothyroidism (NNH)[Q]
- *Disorders screened among neonates:*
  - Neonatal hypothyroidism
  - Phenylketonuria
  - Sickle cell anemia
  - Thalassemia
  - Congenital dislocation of hip
  - Other disorders: G6PD deficiency

Phenylketonuria and Guthrie Test[Q]

- *PKU is an autosomal recessive trait*[Q] with a frequency of 1 in 10,000 births
  - *Enzyme deficient in PKU:* Phenylalanine hydroxylase[Q]
  - *Treatment of PKU:* restricting or eliminating foods high in phenylalanine, such as breast milk, meat, chicken, fish, nuts, cheese, legumes and other dairy products
- *Guthrie Test:* Is done in neonates for mass screening of Phenylketonuria (PKU)
  - *Guthrie test was the first screening test used in neonates*[Q]
  - *Blood sample* is collected by heel prick of the baby 7 -10 days after birth[Q]
  - *Guthrie Test is negative* in first 2 – 3 days of life
  - *Guthrie test can detect* PKU, Galactosemia and Maple syrup urine disease
  - *Chemicals detected:* Phenylalanine, Phenylpyruvate and Phenyllactate
  - *It is a semi-quantitative test*
  - Currently, Guthrie test has been replaced by *Tandem mass Spectrometry*

Neonatal Hypothyroidism

I *Most common neonatal disorder to be screened: Neonatal hypothyroidism*

- *Most common neonatal disorder to be screened:* Neonatal *hypothyroidism (NNH)*[Q]
  - NNH has a frequency of 1 in 4000 birth
  - *MCC of congenital hypothyroidism:* Iodine deficiency[Q]
- *Blood sample collected from:* Cord's Blood[Q]
- *Test involves measurement of:* T4 or TSH both simultaneously
  - As a single method, T4 is more useful (greater precision and reproducibility[Q]
- *Treatment:* Daily dose of thyroid hormone (thyroxine) by mouth

GERIATRICS

I *Geriatric age group among Indian population*[Q]*:* 8.1%

- *Age group for geriatrics in India:* 60 years and above[Q]
- *Geriatric age group among Indian population*[Q]*:* 8.1%

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- *MC health disorder among Indian geriatrics:* Visual impairment (Cataract) [Q]
- *MCC death among Indian geriatric aged above 70 years:* Cardiovascular disorders[Q]

MISCELLANEOUS

Semen analysis [NEW WHO Guidelines 2013]

Parameter	Lower reference limit
Semen volume (ml)	1.5
Total sperm number	39 X 106 per ejaculate
Sperm concentration	15 X 106 per ml
Total motility	40%
Progressive motility	32%
Vitality (live spermatozoa)	58%
Sperm morphology (normal forms)	4%
pH	>7.2
Peroxidase-positive leukocytes	<1.0 X 106 per ml
MAR test (motile spermatozoa with bound particles)	<50%
Immunobead test (motile spermatozoa with bound beads)	<50%
Seminal zinc	>2.4 micromol/ejaculate
Seminal fructose	>13 micromol/ejaculate
Seminal neutral glucosidase	>20 mU/ejaculate

- *Grading of sperm motility:*
  - *Grade I:* Immotile (no movement at all)
  - *Grade II:* Non-progressive motility (no movement but tails move)
  - *Grade III:* Non-linear motility, curved/crooked motility (type b)
  - *Grade IV:* Linear progressive motility (type a)

Child Placement

- *Orphanages:* For children who have no home or cannot be taken care of by their parents
- *Foster Homes:* Several types of facilities for rearing children other than in natural families
- *Adoption:* Legal adoption confers upon child and the adoptive parents, rights and responsibilities similar to that of natural parents
- *Borstals*[Q]*:* Boys over 16 years who are too difficult to be handled in a certified school or have misbehaved there, are sent to a Borstal. Borstal, as an institution, falls between a certified school and an adult prison:
  - A borstal sentence is usually for 3 years, and is regarded as a method of training and reformation
- *Remand Homes:* Child is placed under the care of doctors, psychiatrists and other trained personnel to improve the mental and physical well being of the child

Borstals

- *Borstal:* Boys over 16 years who are too difficult to be handled in a certified school or have misbehaved there, are sent to a Borstal[Q]
  - Borstal, as an institution, falls between a certified school and an adult prison
- *Primary objective of borstal:* Is to ensure care, welfare and rehabilitation of young offenders and to keep them away from the contaminating atmosphere of the prison
  - The emphasis is given on the education, training and moral influence, conducive for their reformation and prevention of crime
  - A borstal sentence is usually for 3 years, and is regarded as a method of training and reformation
- *Borstals in India:* Borstals do not come under the Children Act but are governed by the '*State Inspector General of Prisons*'

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- 12 Borstals in India [2005]
- Total inmate capacity: 2260
- Total inmate population: 1106 (Boys 970; Girls 136)

- *Bombay Borstal School Act, 1929:* It authorizes First Class Magistrate and Superior Courts to pass in lieu of imprisonment, an order for detention in a borstal school for not < 3 or > 5 years; It applies to young offenders[Q],
  - Boys: 16 – 21 years age
  - Girls: 18 – 21 years age

Congenital Disorders among Newborns

- *Congenital disorders:* Those diseases that are substantially determined before or during birth and which, in principle, are recognizable in early life
- *Incidence of congenital disorders (World):* 30 – 70 per 1000 live births
  - MC disorders are of cardiovascular system and nervous system
- *Birth defects in Indian newborns* are seen in 2.5%[Q]. The figure rises to 4% if they are followed upto age of 5 years
  - *MC birth defect in North India:* Neural tube defects or spina bifida[Q]
  - *MC birth defect in rest of India:* Musculoskeletal disorders[Q]

Children in Difficult Circumstances[Q]

I *Birth defects in Indian newborns are seen in 2.5%[Q]*

- Homeless children
- Orphaned or abandoned children
- Whose parents cannot take care of them
- Children separated from parents
- Migrant or refugee children
- Street children
- Trafficked children
- Working children
- Children in prostitution
- Children in bondage
- Children of sex workers/prostitutes
- Children of prisoners
- Children affected by conflicts
- Children affected by natural disasters
- Children affected by HIV/AIDS
- Children suffering from terminal diseases
- Girl child
- Children with disabilities and special needs
- Children belonging to minorities, SC, ST
- Children in institutional care
- Children in conflict with law
- Children who are victims of crime

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MULTIPLE CHOICE QUESTIONS

MCH

1. **The extra energy allowances needed per day during pregnancy is:** *[AIPGME 2006, Recent Question 2012]*
   (a) 150 KCals
   (b) 200 KCals
   (c) 300 KCals
   (d) 550 KCals

2. **Additional daily energy requirement during the first six months for a lactating woman is:** *[AIIMS Nov 03] [UP 2005]*
   (a) 350 K calories
   (b) 450 K calories
   (c) 550 K calories
   (d) 650 K calories

3. **Under MCH programme, iron and folic acid tablets to be given daily to mother has:** *[AIPGME 2003, AIIMS May 04]*
   (a) 60 mg iron + 500 mcg folic acid
   (b) 100 mg iron + 500 mcg folic acid
   (c) 60 mg iron + 100 mcg folic acid
   (d) 100 mg iron + 100 mcg folic acid

4. **Which of the following is not included in '5 cleans' in conduct of delivery?** *[AIIMS, May Dec 1994]*
   (a) Clean hands
   (b) Clean perineum
   (c) Clean cutting and care of cord
   (d) Clean surface for delivery

5. **A 37 weeks pregnant woman attends an antenatal clinic at a Primary Health Centre. She has not had any antenatal care till now. The best approach regarding tetanus immunization in this case would be to:** *[AIPGME 04]*
   (a) Give a dose of Tetanus Toxoid (TT) and explain to her that it will not protect the new born and she should take the second dose after four weeks even if she delivers in the meantime
   (b) Do not waste the TT vaccine as it would anyhow be of no use in this pregnancy
   (c) Given one dose of TT and explain that it will not be useful for this pregnancy
   (d) Give her anti-Tetanus Immunoglobulin along with the TT vaccine

6. **All are criteria for identifying 'at risk' infants except:**
   (a) Birth weight less than 2.8 kg *[AIPGME 1996]*
   (b) Birth order 5 or more
   (c) PEM, diarrhoea
   (d) Working mother

7. **Over and above metabolic requirements, a pregnancy in total duration consumes about:** *[AIIMS Dec 1994]*
   (a) 10000 kcal
   (b) 20000 kcal
   (c) 40000 kcal
   (d) 60000 kcal

8. **Average weight gain during pregnancy in poor Indian women is about:** *[AIIMS Dec 1994]*
   (a) 12 kg
   (b) 10 kg
   (c) 6.5 kg
   (d) 2.5 kg

9. **All are true regarding Congenital Syphilis except:** *[AIIMS Dec 1995]*
   (a) Procaine Penicillin can prevent it satisfactorily
   (b) Infection of the fetus most commonly occurs in 1st trimester
   (c) Neurological damage with mental retardation can be a serious consequence
   (d) If mother has Late syphilis, chances of transmission decreases

10. **A 24-year-old primigravida wt 57 kg, Hb 11.0 gm% visits an antenatal clinic during 2nd trimester of pregnancy seeking advice on dietary intake. She should be advised:** *[DPG 2011]*
    (a) Additional intake of 300 Kcal
    (b) Additional intake of 500 Kcal
    (c) Additional intake of 650 Kcal
    (d) No extra Kcal

11. **MCH care is assessed by** *[Recent Question 2012]*
    (a) Death rate
    (b) Birth rate
    (c) Maternal mortality rate
    (d) Anemia in pregnancy

12. **Late pregnancy calorie requirement is:**
    (a) 2800 *[DNB December 2011]*
    (b) 3000
    (c) 1500
    (d) 2300

13. **The daily extra calorie requirement in first trimester of pregnancy is:** *[DNB 2007]*
    (a) 50
    (b) 150
    (c) 350
    (d) 450

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14. Recommended dose of folic acid during pregnancy is *[PGMCET 2015]*
(a) 200 mg/day
(b) 300 mg/day
(c) 400 mg/day
(d) 500 mg/day

LBW

15. For a given population, minimum no. of newborns to be examined for calculating percentage of LBW babies is: *[AIIMS Nov 2005]*
(a) 100 babies
(b) 500 babies
(c) 1000 babies
(d) 10,000 babies

16. Mean Birth weight of Indian babies is
(a) 2.5 kg *[AIPGME 2001]*
(b) 2.8 kg *[Recent Question 2013]*
(c) 3.1 kg
(d) 3.5 kg

17. By international agreement, low birth weight has been defined as a birth weight when measured within the first hour of life is: *[Karnataka 2004]*
(a) Less than 2000 grams *[Recent Question 2012]*
(b) Less than 2500 grams
(c) Less than 2800 grams
(d) Less than 3000 grams

18. As per WHO low birth weight is defined as:
(a) Birth weight less than 2.5 kg *[PGI Dec 03]*
(b) Birth weight < 10th percentile *[Recent Question 2013]*
(c) Gestational age < 34 weeks
(d) Gestational age < 28 weeks

19. Which of the following advise should be given for an infant suffering from mild diarrhea? *[DPG 2007]*
(a) Continue breast feeding
(b) Antibiotics
(c) Stop all breast feed and start ORS
(d) Intravenous fluid administration

20. The term used for babies born as a result of retarded intrauterine fetal growth is: *[Karnataka 2005]*
(a) Pre-term babies
(b) Low birth weight babies
(c) Small for date babies
(d) Retarded babies

21. Minimum antenatal visit as per MCH is: *[PGI Dec 03]*
(a) 1 *[MH 2000]*
(b) 2
(c) 3
(d) 4
(e) 5

22. Prevalence of low birth weight in India is: *[Recent Question 2012]*
(a) 26%
(b) 28%
(c) 30%
(d) 32%

Review Questions

23. The outer line of under-5 clinic which touches all others is: *[DNB 2002]*
(a) Preventive care
(b) Growth monitoring
(c) Health education to mother
(d) Immunisation

24. The best parameter for assessment of chronic malnutrition is: *[DNB 2005]*
(a) Weight for age
(b) Weight for height
(c) Height for age
(d) Any of the above

25. A boy age 6 years, weight 13 kg. PEM grading:
(a) Grade II *[Bihar 2006]*
(b) Grade I
(c) Grade III
(d) Grade IV

26. After birth, care of eye of newborn is by:
(a) Crede's method *[UP 2002]*
(b) Antibiotics
(c) Normal saline
(d) $AgNO_3$ eye drop

27. Essential criteria for K washiorkor is: *[UP 2002]*
(a) Body weight is less than 60%
(b) Thin dry brittle hair
(c) Vocarious appetite
(d) Edema in dependent part

28. Preterm babies: *[UP 2006]*
(a) Born before 37 weeks
(b) Born before 40 weeks
(c) Born before 42 weeks
(d) Born before 47 weeks

29. Folic acid supplementation during lactation period is:
(a) 100 mg/d *[UP 2007]*
(b) 150 mg/d
(c) 400 mg/d
(d) 450 mg/d

30. Elemental iron supplementation in Iron deficiency anemia is: *[UP 2008]*
(a) 300 – 400 mg
(b) 150 – 200 mg
(c) 100 – 150 mg
(d) < 100 mg

31. WHO in which year concelved the idea of Safe Motherhood initiative at a conference in Nairobi, Kenya: *[AP 2007]*
(a) 1987
(b) 1980

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(c) 1990
(d) 1997

32. Protective shield is made up of: *[MP 2003]*
(a) Copper
(b) Lead
(c) Iron
(d) Platinum

33. Which of the following is age independent indicator of malnutrition? *[MP 2006]*
(a) Underweight
(b) Stunting
(c) Wasting
(d) MAC

34. Osteomalacia in pregnancy and lactation is best treated by: *[MH 2000]*
(a) Vitamin D
(b) Vitamin D and calcium
(c) Calcium
(d) Vitamin D-calcium and phosphorous

35. Daily need of calories in pregnancy is: *[MH 2003]*
(a) 1500 kCals
(b) 2000 kCals
(c) 2500 kCals
(d) 3500 kCals

36. The average weight of newborn in South India is:
(a) 2.2 kg *[TN 2000]*
(b) 2.5 kg
(c) 3.0 kg
(d) 3.5 kg

37. The target of 'Health for All by 2000' for reduction in the incidence of low birth weight was: *[MP 2009]*
(a) Less than 10%
(b) 15%
(c) 20%
(d) 30%

38. For low birth weight of Indian babies the weight criteria is birth weight less than: *[MH 2007]*
(a) 2.2 kg
(b) 2.0 kg
(c) 2.5 kg
(d) 2.7 kg

39. Most common cause of low birth wt baby is: *[RJ 2004]*
(a) Prematurity
(b) Infection
(c) Anemia
(d) Diabetes

MCH INDICATORS

40. All of the following are common cause of post neonatal infant mortality in India, *except*: *[MP 01, AIPGME 02]*
(a) Tetanus
(b) Malnutrition
(c) Diarrhoeal diseases
(d) Acute respiratory infection

41. Maternal Mortality Ratio is calculated by: *[Recent Question 2014]*
(a) Maternal deaths/live birth *[AIIMS May 08]*
(b) Maternal deaths/1000 live births
(c) Maternal deaths/100000 live births
(d) Maternal deaths/100000 population

42. Which one of the following is the leading cause of mortality in under five children in developing countries? *[AIPGME 2004]*
(a) Malaria
(b) Acute lower respiratory tract infections
(c) Hepatitis
(d) Pre-maturity

43. All of the following deaths are included in as causes of maternal death *except*: *[AIIMS June 1997]*
(a) Following abortion
(b) During lactation 1st month
(c) During lactation 8th month
(d) During the last trimester due to APH

44. All of the following statements are true about the childhood mortality rates in India *except*:
(a) Almost half of infant mortality rate (IMR) occurs in neonatal period. *[AIIMS Nov 2005]*
(b) Almost 3/4th of the under-five mortality occurs in the first year of life.
(c) About one in thirteen children die before they reach the age of five years.
(d) Neonatal mortality is higher among female children as compared to males.

45. Among the following the best indicator of health in a community is: *[AIIMS Dec 1994]*
(a) Maternal mortality rate
(b) Infant mortality rate
(c) Life expectancy
(d) Neonatal mortality rate

46. Leading Cause of maternal deaths in India is:
(a) Anemia *[AIIMS May Nov 02- 04, 05,*
(b) Hemorrhage *May 08, Nov 02 AIPGME 08]*
(c) Sepsis *[AIIMS 2011, MP 2005]*
(d) Obstructed labour

47. Of total deaths in India per year, infant deaths contribute about: *[AIIMS Dec 1994]*
(a) 6 %
(b) 13 %
(c) 19 %
(d) 44 %

48. Infant mortality does not include: *[AIPGME 2005]*
(a) Early neonatal mortality *[AIIMS November 2014]*
(b) Perinatal mortality *[DNB 2007]*

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(c) Post neonatal mortality
(d) Late neonatal mortality

49. Sensitivity parameter of combined pediatric and obstetric care in our country is: *[AIPGME 2006]*
(a) IMR
(b) PNMR
(c) NNMR
(d) NMR

50. Commonest cause of neonatal mortality in India is:
(a) Diarrheal diseases *[AIIMS May 2003]*
(b) Birth injuries
(c) Low birth weight
(d) Congenital anomalies

51. Maternal mortality ratio (MMR) is expressed as:
(a) Per 100,000 live births *[PGI 2006, DPG 2007]*
(b) Per 1000 live births *[Recent Question 2014]*
(c) Per 100,000 births *[Karnataka 2006]*
(d) Per 1000 births *[MP 2000, RJ 2001]*

52. The postnatal period extends for: *[Karnataka 2005]*
(a) 2 weeks
(b) 4 weeks
(c) 6 weeks
(d) 8 weeks

53. Late foetal deaths and early neonatal deaths are considered in which of the following indices?
(a) Infant mortality rate *[Karnataka 2007]*
(b) Perinatal mortality rate
(c) Still birth rate
(d) Post neonatal mortality rate

54. The highest rate of infant mortality in India is reported from: *[Karnataka 2008]*
(a) Madhya Pradesh
(b) Bihar
(c) Uttar Pradesh
(d) Orissa

55. Mainly included in child survival index: *[PGI June 01]*
(a) MMR
(b) IMR
(c) Mortality between 1 to 4 yr. age
(d) Under 5 mortality

56. Perinatal mortality rate includes: *[Recent Question 2013]*
(a) Deaths within first week of life *[Recent Question 2012, DNB 2010, UP 2001]*
(b) Abortions, Stillbirths, deaths within first week of life *[DNB 2001, 2005, AIPGME 2010]*
(c) Deaths from 28 weeks to with first week of life
(d) Deaths within one month of life

57. In a given population, total births in a year are 4050. There are 50 still births. 50 neonates die within first 7 days of life whereas the number of deaths within 8-28 days of life is 150. What is the Neonatal mortality rate in the population? *[AIIMS Nov 2010]*
(a) 12.5 *[AIIMS 2012, 2014]*
(b) 50
(c) 49.4
(d) 62.5

58. Which of the following is the least likely cause of Neonatal mortality in India? *[AIIMS Nov 2010]*
(a) Severe infections *[Recent Question 2013]*
(b) Congenital malformations
(c) Prematurity
(d) Birth asphyxia

59. Which of the following is the denominator of Maternal Mortality Ratio? *[AIPGME 2011]*
(a) Total number of births
(b) Total number of married women
(c) Total number of live births
(d) Total mid-year population

60. Annual Under-five deaths globally reported are:
(a) 6 million *[AIIMS November 2013]*
(b) 8 million
(c) 10 million
(d) 12 million

61. Leading cause of neonatal mortality in India is:
(a) Infections *[AIIMS November 2012]*
(b) Birth asphyxia/trauma
(c) Diarrhoea
(d) Prematurity and Congenital malformations

62. Extended definition of perinatal mortality includes crown heel length of *[DNB June 2010]*
(a) >15 cm at birth
(b) >25 cm at birth
(c) >35 cm at birth
(d) >45 cm at birth

63. Most common cause of infant mortality in India is?
(a) Low birth weight *[Recent Question, 2012, 2013]*
(b) Respiratory disease
(c) Diarrhoeal diseases
(d) Congenital anomalies

64. Child survival index is calculated by?
(a) 1000-IMR/10 *[Recent Question 2013]*
(b) IMR-1000/10
(c) 1000-U5MR/10
(d) U5MR-1000/10

65. The current neonatal mortality is: *[Recent Question 2013, MP 2009]*
(a) 28
(b) 30
(c) 33
(d) None

66. Maternal mortality is maximum in …….. period:
(a) Antepartum *[Recent Question 2012, 2013]*
(b) Peripartum
(c) Postpartum
(d) None

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67. Maternal mortality rate definition include all *except*:
(a) Death in pregnancy *[NIMHANS 2014, DNB 2001]*
(b) Death during delivery
(c) Death within 6 weeks post delivery
(d) Death within 6 months post delivery

68. Maternal death is defined as, when mother dies during pregnancy or at the time of delivery or after delivery upto *[PGMCET 2015]*
(a) 4 weeks
(b) 6 weeks
(c) 8 weeks
(d) 10 weeks

69. Acute Respiratory Infections (ARI) are important causes of under-five mortality in India. In remote areas, Children develop frequent episodes of ARI. What measures will you take for prevention and control of ARI amongst under-five children in that area? *[UPSC CMS 2015]*
(a) Case management and Health education to mothers
(b) Vaccination
(c) Controlling malnutrition, Promoting breast feeding, Vitamin A supplementation
(d) All of these

Review Questions

70. What is the denominator of perinatal mortality rate?:
(a) Total live births + still births *[Bihar 2003]*
(b) Live births is the same year
(c) Total live births weighing over 1000 grams at birth
(d) Late fetal deaths + early neonatal deaths

71. Numerator in infant mortality rate is: *[UP 2000]*
(a) Less than 1 year
(b) 28 days
(c) 1 months
(d) Equal to 1 year

72. Denominator in, under 5 proportionate mortality rate is: *[UP 2002]*
(a) Mid year population
(b) Mid year population in 5 years age
(c) Number of live birth in same year
(d) Total death in same year

73. The following does not suggest Under Five Care in the community: *[AP 2005]*
(a) Infant mortality rate
(b) 1-4 year mortality
(c) Neonatal tetanus
(d) Deaths due to diarrhoeal disease between 1-5 years

74. In a population of 5000, with birth rate of 30/1000 population, 15 children died during first year life in one year: of these 9 died during first month of life. What is the infant mortality rate in this population? *[MP 2006]*
(a) 100
(b) 60
(c) 150
(d) 45

75. In India, approximately 50% of maternal deaths are caused by: *[MP 2009]*
(a) Sepsis and abortion
(b) Sepsis and obstructed labour
(c) Sepsis and Hypertension
(d) Sepsis and hemorrhage

76. For international comparison, the WHO expert committee defines 'still birth' as birth of dead and under weight of fetus more than — grams:
(a) 500 *[MHPGMCET 2008] [MH 2006]*
(b) 1000
(c) 1500
(d) 2000

77. Commonest cause of perinatal mortality in India:
(a) Prematurity *[RJ 2001]*
(b) Birth injury
(c) Metabolic
(d) Congenital

78. Infant mortality rate is no. of infant death per:
(a) 1000 total birth *[RJ 2005, MP 2006]*
(b) 1000 live birth
(c) 1000 pregnancy
(d) None

BREAST FEEDING

79. The following statements about breast milk are true *except*: *[AIPGME 2004]*
(a) The maximum milk output is seen at 12 months
(b) The coefficient of uptake of iron in breast milk is 70%
(c) Calcium absorption of human milk is better than that of cow's milk
(d) It provides about 70 K cals per 100 ml

80. The current recommendation for breast-feeding is that: *[AIPGME 1999, 2004]*
(a) Exclusive breast-feeding should be continued till 6 months of age followed by supplementation with additional foods
(b) Exclusive breast-feeding should be continued till 4 months of age followed by supplementation with additional foods
(c) Colostrum is the most suitable food for a new born baby but it is best avoided in first 2 days
(d) The baby should be allowed to breast-feed till one year of age

81. As compared to Cow's milk, human milk has:
(a) More proteins *[AIIMS May 07, Nov 07]*
(b) Less carbohydrates
(c) More iron
(d) Less of Vitamins

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82. Mean output of breast milk per day is maximum during the following months of lactation: *[AIIMS Nov 2008]*
(a) 0-2 months
(b) 3-4 months
(c) 5-6 months
(d) 7-8 months

83. As compared to cow milk, breast milk contains more:
(a) Energy *[DPG 2005]*
(b) Fat
(c) Lactose
(d) Proteins

84. Not true about breast milk is: *[AIIMS May 2011]*
(a) Maximum output is at 12 months of lactation
(b) Coefficient of iron absorption is 70%
(c) Calcium utilization more than cows milk
(d) Breast milk contains high amounts of lactose

85. Human breast milk has more of: *[PGI May 2011]*
(a) Lipids *[Karnataka 2011, Recent Question 2012]*
(b) Carbohydrates
(c) Proteins
(d) Iron
(e) Calcium

86. In normal delivery, breast feeding should be started within: *[Recent Question 2012]*
(a) ½ hour of delivery
(b) 1 hour of delivery
(c) 4 hour of delivery
(d) 6 hour of deliver

87. A woman suffering from active tuberculosis not on ATT has a full term vaginal delivery. All the following should be done *except*: *[UPSC CMS 2015]*
(a) Breastfeed the neonate
(b) BCG should be given to the neonate
(c) Neonate should be given INH
(d) Neonate should be isolated from mother

Review Questions

88. Amount of calcium in human milk in 100 ml:
(a) 28 mg *[Bihar 2003]*
(b) 48 mg
(c) 34 mg
(d) 60 mg

89. Why casein ratio in breast milk is: *[TN 2000]*
(a) 1:1
(b) 2:1
(c) 3:8
(d) 7:3

90. World breast feeding week is celebrated in month of:
(a) January *[MP 2003]*
(b) August
(c) October
(d) April

GROWTH AND DEVELOPMENT

91. The uppermost line of the 'road to health card' is equivalent to: *[AIIMS Jan 1998]*
(a) 80% for boys *[DNB 2001, 2005, MH 2006]*
(b) 50% for girls
(c) 50th percentile for boys
(d) 3rd percentile for girls

92. Deficit in weight for height in a 3-year-old child indicates: *[AIIMS Nov 2005]*
(a) Acute malnutrition
(b) Chronic malnutrition
(c) Concomitant acute and chronic malnutrition
(d) Under weight

93. The milestone of development not matched correctly with age: *[AIPGME 2006]*
(a) Sits without support: 6 – 8 months
(b) Looks at mother and smiles: 6 – 8 weeks
(c) Holds head erect: 6 months
(d) Transfers objects hand to hand: 6 – 8 months

94. If the birth weight is 3 kg by the end of one year of age it should become: *[AIIMS May 2001]*
(a) 6 kg
(b) 9 kg
(c) 12 kg
(d) 15 kg

95. At birth head circumference is about:
(a) 32 cm *[AIIMS May 1994]*
(b) 34 cm
(c) 36 cm
(d) 38 cm

96. WHO Growth Chart has got information for all *except*: *[AIIMS Nov 1992]*
(a) Immunisation procedures
(b) Child spacing
(c) History of sibling health
(d) History of maternal health

97. Around whole symbol for Under-five's clinic there is a border touching all other areas. This border represents:
(a) Preventive care *[AIPGME 1994]*
(b) Care in illness
(c) Growth monitoring
(d) Health education

98. In WHO growth chart 'Lower reference curve' represents: *[Karnataka 2006]*
(a) 3 rd percentile
(b) 50 th percentile
(c) 80 th percentile
(d) 95 th percentile

99. All are true about growth chart *except*:
(a) It is a tool for educating mothers
(b) The position of dots is more important than direction *[AIIMS Nov 09]*

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(c) Between top 2 lines, it shows 'Road-to-Health' or 'zone of normality'
(d) Lowermost line corresponds to children below 3 percentile

100. Which of the following does not indicate poor nutrition in children? *[AIPGME 2010]*
(a) Low birth weight *[Recent Question 2012]*
(b) Infection
(c) Hemoglobin > 11 gm%
(d) Malnutrition

101. Best indicator for growth measurement is: *[Recent Question 2013]*
(a) Height
(b) Weight
(c) Arm circumference
(d) None

102. Type of Growth Charts used by Anganwadi workers (ICDS) for growth monitoring *[AIIMS May 2013]*
(a) NCHS
(b) IAP
(c) MRGS
(d) CDC

103. Age independent anthropometric measure of malnutrition is *[DNB June 2009]*
(a) Weight/height
(b) Mid arm circumference
(c) Head circumference
(d) Mid arm circumference/height

104. The best parameter for assessment of chronic malnutrition is *[DNB 2007]*
(a) Weight for age
(b) Weight for height
(c) Height for age
(d) Any of the above

105. In WHO "Road to Health" chart, upper and lower limit of represents *[AIIMS May 2012]*
(a) 30 percentile for boys and 3 percentile for girls
(b) 50 percentile for boys and 3 percentile for girls
(c) 30 percentile for boys and 5 percentile for girls
(d) 50 percentile for boys and 5 percentile for girls

106. According to NFHS 3, percentage of wasting in India is
(a) 23% *[DNB June 2010]*
(b) 35%
(c) 40%
(d) 50%

107. Height of a Newborn doubles by the age of
(a) 5 months *[Recent Question 2015]*
(b) 1 year
(c) 4 years
(d) 5 years

108. In 'Milestones of Development' 'Listening' refers to which type of development? *[PGMCET 2015]*
(a) Motor
(b) Language
(c) Adaptive
(d) Sociopersonal

109. Which of the milestone develops first? *[ESI IMO 2014]*
(a) Mirror play
(b) Crawling
(c) Creeping
(d) Pincer grasp

110. Which of the following is the Best indicator of Long term nutritional status? *[ESI IMO 2014]*
(a) Mid arm circumference
(b) Height for age
(c) Weight for age
(d) Weight for height

Review Questions

111. The best parameter for assessment of chronic malnutrition is: *[DNB 2006]*
(a) Weight for age
(b) Weight for height
(c) Height for age
(d) Any of the above

112. The best parameter for assessment of Acute malnutrition is: *[DNB 2007]*
(a) Weight for age
(b) Weight for height
(c) Height for age
(d) Any of the above

113. Mid-arm Circumference is constant during:
(a) 0-6 months *[Bihar 2004]*
(b) 1-5 years
(c) 5-10 years
(d) 10 years

114. WHO growth chart is: *[UP 2005]*
(a) International based
(b) National based
(c) Home based
(d) Community based

115. Bad prognosis in PEM is indicated by all *except*:
(a) Keratomalacia *[AP 2008]*
(b) Hypothermia
(c) Hepatomegaly
(d) Hypoalbuminemia

116. Road to health card or the growth chart was first designed by: *[Recent Question 2013] [MP 2003]*
(a) Edwin Chadwick
(b) David Morley
(c) C. Gopalan
(d) C.E. Winslow

117. The lower limit of the normal range in a growth chart curve is: *[MP 2007]*
(a) 80% median weight
(b) 70% median weight

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(c) 60% median weight
(d) 85% median weight

118. True about WHO growth chart is:
(a) Used for monitoring growth and development of child *[MH 2000]*
(b) Has 3 lines
(c) Highest line corresponds to 80th percentile and above
(d) Lowest line corresponds to 50th percentile and above

119. Growth chart used in India has curves: *[RJ 2003]*
(a) Two
(b) Three
(c) Four
(d) Five

SCHOOL HEALTH

120. The commonest morbidity in schools is:
(a) Dental ailments *[AIIMS Jan 1998]*
(b) Worm infestations
(c) Malnutrition
(d) Skin diseases

121. All of the following are minimum standards for sanitation of schools and its environs in India *except*: *[AIPGME 2003]*
(a) Desks to be of 'Minus type'
(b) Combined doors + windows area = 25 % of floor space area
(c) Maximum 40 students per classroom
(d) One urinal for 10 students and one latrine for 25 students

122. With reference to school health, which one of the following statements is NOT correct? *[AIPGME 2004]*
(a) Per capita space for students in classroom should not be less than 10 sq ft.
(b) Desks should be of plus type
(c) Classroom should have sufficient natural light preferably from the left
(d) There should be one urinal for 60 students and one latrine for 100 students

123. Maximum recommended number of students in a school class room: *[Recent Question 2014]*
(a) 30
(b) 35
(c) 40
(d) 50

Review Questions

124. A – Sex education should not be given in school R – It will lead to increased incidence of sexual promiscuity:
(a) A and R correct and R explains A *[DNB 2000]*
(b) A and R correct and R does not explain A
(c) A is correct, R is incorrect
(d) A is incorrect, R is correct

125. A – Sex education should not be given in school R – It will lead to increased incidence of sexual promiscuity:
(a) A and R correct and R explains A *[DNB 2000]*
(b) A and R correct and R does not explain A
(c) A is correct, R is incorrect
(d) A is incorrect, R is correct

126. True about Mid-day meal given in school: *[DNB 2006]*

	Calories	Proteins
(a)	1/3	1/2
(b)	1/3	1/3
(c)	1/2	1/2
(d)	1/2	1/3

127. Ideal desk recommended for a school child is:
(a) 'Plus' desk *[UP 2001, 2007, DNB 2009]*
(b) 'Minus' desk
(c) Lysine and Leucine
(d) Zero desk

128. According to Healthful school environmental criteria, per cent of doors and windows to floor area should be:
(a) 15% *[UP 2006, MP 2009]*
(b) 20%
(c) 25%
(d) 30%

ICDS, IMNCI, BFHI

129. The guidelines according to Baby Friendly Hospital Initiative includes all *except*: *[AIPGME 2009]*
(a) Mothers and infant to be together for 24 hours a day
(b) Mother to initiate breast feeding within 4 hours of normal delivery
(c) Giving newborn infants no food or drink other than breast milk
(d) Encouraging breast feeding on demand

130. Which of the following is the nodal ministry for Integrated Child Development Services (ICDS)?
(a) Ministry for Human Resource Development
(b) Ministry for Rural Development *[AIIMS May 04]*
(c) Ministry for Health and Family Welfare
(d) Ministry for Social Justice

131. Integrated Management of Childhood Illness (IMCI) was taken to prevent morbidity and mortality from all *except*: *[AIPGME 2008]*
(a) Malaria
(b) Malnutrition
(c) Otitis media
(d) Neonatal tetanus

132. Which of the following is known as 'Heart of ICDS system'? *[AIIMS Feb 1997]*
(a) Mother and Children
(b) CDPO

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(c) Primary Health Centre
(d) Anganwadi

133. Administrative unit of the ICDS project in rural areas is: *[Recent Question 2013] [Karnataka 2007]*
(a) PHC
(b) Community development block
(c) Zilla parishad
(d) Gram panchayat

134. Population covered by Anganwadi in tribal area is:
(a) 1000 *[DNB June 2009]*
(b) 700
(c) 400
(d) 100

135. Mother friendly childbirth initiative was launched in:
(a) India *[Recent Question 2014]*
(b) Britain
(c) Australia
(d) USA

136. Diet given to a pregnant lady under ICDS is: *[AIIMS November 2014]*
(a) 200 Kcal + 10 grams proteins *[AIIMS 2001]*
(b) 250 Kcal + 12 grams proteins
(c) 300 Kcal + 15 grams proteins
(d) 350 Kcal + 15 grams proteins

137. ICDS include children upto age of years:
(a) 3 *[Recent Question 2014]*
(b) 5
(c) 6
(d) 14

Review Questions

138. All are true about Anganwadi workers *except*:
(a) Covers population of 5000 *[UP 2002]*
(b) Time part workers
(c) Supply nutrition, educate to vaccination
(d) Under controls ICDS

139. In ICDS all of the following are included *except*:
(a) Immunization *[TN 2003]*
(b) Health Education
(c) Prevention of iodine deficiency disorders
(d) Supplementary nutrition

140. ICDS does not cover: *[Kolkata 2005]*
(a) Nutritional supplementation
(b) Formal education
(c) Health education
(d) Immunization

141. IMNCI includes all *except*: *[Kolkata 2009]*
(a) Tetanus
(b) Acute respiratory tract infection
(c) Measles
(d) Malaria

142. In plains, generally how much population is allocated to an AW Centre? *[MP 2006]*
(a) 500
(b) 1000
(c) 5000
(d) 25000

143. According to ICDS programme, children should be supplemented with which of the following? *[MH 2002]*
(a) 200 cal + 20 g proteins *[AIIMS 2000, 2001]*
(b) 300 cal + 15 g proteins
(c) 500 cal + 25 g proteins
(d) 300 cal + 10 g proteins

144. According to IMNCI Programme the term "YOUNG INFANTS" includes children below the what age?
(a) Seven days *[MH 2008]*
(b) 28 days
(c) Two months
(d) Six months

NEONATAL SCREENING

145. 'Guthrie Test' is done in neonates for mass screening of: *[AIPGME 1999]*
(a) Neonatal Hypothyroidism
(b) Phenylketonuria
(c) Hemoglobinopathies
(d) Congenital Dislocation of Hip

146. Most common neonatal disorder screened is:
(a) Neonatal hypothyroidism *[AIPGME 1998]*
(b) Phenylketonuria
(c) Hemoglobinopathies
(d) Congenital Dislocation of Hip

MISCELLANEOUS

147. According to WHO criteria, all are true in a normal person *except*: *[AIIMS May 08]*
(a) Sperm count >20 million
(b) Volume >1 ml
(c) Normal morphology in >15% (strict criteria)
(d) Aggressive forward motility in >25%

148. Kishori Shakti Yojana (KSY) is: *[AIIMS Nov 2006]*
(a) Empowerment of females under Maternity Benefit Scheme
(b) Adolescent girl's scheme under ICDS
(c) Free and compulsory education for girl child
(d) Child care home scheme for female juvenile delinquents

149. Which of the following is known as 'the medical discovery of 20th century'? *[AIIMS Jan 2000]*
(a) Zidovudine
(b) Smallpox vaccine
(c) ORS
(d) Penicillin

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150. At PHC level, a women who complains of spotting following IUCD insertion should be advised: *[AIPGME 2006]*
(a) Analgesic and observation
(b) Antibiotic and observation
(c) Iron supplements and observation
(d) Removal of IUCD

151. Hb of less than what value is the cut off used by WHO guidelines to label an infant under 6 months of age as being anemic? *[AIIMS Nov 01]*
(a) 100 g/L
(b) 105 g/L
(c) 110 g/L
(d) 115 g/L

152. In which one of the following situations is Amniocentesis NOT called for? *[AIIMS Nov 1999]*
(a) Mother's age is 35 year or more
(b) Parents who are known to have chromosomal translocation
(c) Raised alpha fetoprotein in amniotic fluid during earlier pregnancy
(d) A Rh –ve multipara mother aged 30 years with two live healthy boys

153. When an abandoned child is legally accepted by a couple, it is called as: *[AIIMS Nov 2000]*
(a) Remand home placement and Foster home placement
(b) Remand home placement and Borstal placement
(c) Adoption and Foster home placement
(d) Adoption and Remand home placement

154. Boys over 16 years who are difficult to be handled in a certified school are sent for training and reformation, for 3 yrs, to a: *[AIIMS Nov 1993]*
(a) Orphanage
(b) Foster home
(c) Borstal
(d) Remand home

155. Birth defects in Indian newborns are seen in:
(a) 2-3% of newborns *[AIPGME 2003]*
(b) 5% of newborns
(c) 8% of newborns
(d) 12-14% of newborns

156. Boys over 16 years who are too difficult to be handled in a certified school or have misbehaved are sent to:
(a) Remand home *[DPG 2005]*
(b) Borstal
(c) Foster home
(d) Prison

157. Child rights are guaranteed in which article of the constitution: *[PGI Dec 01]*
(a) Article 24
(b) Article 28
(c) Article 35
(d) Article 42
(e) Article 45

158. Ujjwala scheme is for prevention of:
(a) Child abuse *[Recent Question 2013]*
(b) Child trafficking
(c) Child labour
(d) Child marriage

159. A place where children are kept in care of doctor and psychiatrist is: *[Recent Question 2012]*
(a) Borstal
(b) Foster home
(c) Remand home
(d) Orphangae

160. All are included in Kangaroo Mother Care *except*:
(a) Skin to skin contact *[AIIMS May 2014]*
(b) Early discharge and follow up
(c) Free nutritional supplements
(d) Exclusive Breast feeding

161. Ujjwala Scheme include all *except*:
(a) Rescue *[Recent Question 2015]*
(b) Rehabilitation
(c) Remuneration
(d) Repatriation

162. According to the United Nations Convention on the Rights of the Child, which of the following is/are the right/rights of the children?
(1) Right to expression
(2) Right to recreation
(3) Right to name and nationality

Select the correct answer using the code given below: *[UPSC CMS 2015]*
(a) 1 and 2 only
(b) 3 only
(c) 1, 2 and 3
(d) None of these is a Right of the children

Review Questions

163. Under 1971, MTP act, MTP is allowed up to:
(a) 12 weeks *[RJ 2002, PGMCET 2015]*
(b) 16 weeks
(c) 20 weeks
(d) 24 weeks

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EXPLANATIONS

MCH

1. **Ans. NONE [Its + 350 kcals]** *[Ref. Park 23/e p636]*
   - *The recommended daily energy intake*: [NEW GUIDELINES 2011]

Group	Energy Allowance per day (Kcal)
Infancy	
0-6 months	92 Kcal/kg/day
6-12 months	80 Kcal/kg/day
Adult Reference Male (Wt: 60 Kg)	
Sedentary/Light work	2320
Moderate Work	2730
Heavy Work	3490
Adult Reference Female (Wt: 55 kg)	
Sedentary/Light work	1900
Moderate Work	2230
Heavy Work	2850
Pregnancy	+ 350
Lactation	
First 6 months	+ 600
6-12 months	+ 520

(+ indicates 'over and above the daily requirement')

2. **Ans. NONE [Its 600 kcalories]** *[Ref. Park 23/e p636]*
3. **Ans. (b) 100 mg iron + 500 mcg folic acid** *[Ref. Park 23/e p527]*
   - *An adult tablet of IFA contains*: 100 mg elemental Iron and 500 mcg Folic acid (to be given for 100 days minimum in pregnancy)
   - *A pediatric tablet of IFA contains*: 20 mg elemental Iron and 100 mcg Folic acid (to be given for 100 days minimum every year till 5 years age of child)

Also Remember

- At MCH centres several supplements are provided free of cost to expectant mothers:
  - IFA tablets
  - 2 doses of tetanus toxoid
  - Fresh milk (or skimmed milk)
  - Capsules of Vitamin A and D
- *Requirement of Iron and Folic Acid:* Pregnancy > Lactation
- *Recommended daily intake values of folate:*

Group	Intake per day
Healthy adults	200 mcg
Pregnancy	500 mcg
Lactation	300 mcg
Children	100 mcg

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4. **Ans. (b) Clean perineum** *[National Health Programs of India by Dr. J. Kishore, 7/e p108 and 8/e p128, Park 21/e p287, Park 22/e p286]*

CLEANS OF SAFE DELIVERY:

- *'Five cleans'* (practices) under strategies for elimination of neonatal tetanus include,
  - *Clean delivery surface*
  - *Clean hands (of birth attendants)*
  - *Clean cord cut (blade or instrument)*
  - *Clean cord tie*
  - *Clean cord stump (no applicant)*

Also Remember

- *5 F's of Sanitation Barrier*:
  - Fingers
  - Flies
  - Fomites`
  - Food
  - Faeces
- *5 D's of Ill-health*:
  - Disease
  - Discomfort
  - Disability
  - Dissatisfaction
  - Death
- *4 D's of Pellagra*:
  - Diarrhoea
  - Dermatitis
  - Dementia
  - Death
- *5 I's of Ageing (old age)*:
  - Impairment
  - Instability
  - Incontinence
  - Immobility
  - Isolation

5. **Ans. (a) Give a dose of Tetanus Toxoid (TT) and explain to her that it will not protect the new born and she should take the second dose after four weeks even if she delivers in the meantime** *[Ref. Park 23/e p528]*

Also Remember

- *In developing countries, antenatal mothers should be given TT irrespective of period of gestation (as she may not return)*; There is no evidence to suggest that TT is dangerous or harmful to fetus
- *Infants born to unimmunized mothers or partially immunized mothers should be given*: 750 IU antitoxin (heterologous serum) within 6 hours of birth (for prevention of neonatal tetanus)

6. **Ans. (a) Birth weight less than 2.8 kg** *[Ref. Park 23/e p535]*
   - *At risk approach*: Central purpose is to identify high risk cases (as early as possible) from a large group of all antenatal mothers/infants, and *provide specialized care* to them, *while continuing to provide appropriate care to all antenatal mothers/infants*
   - *At risk infants*: Contribute to perinatal, neonatal and infant mortality; so they have to be provided with special intensive care; Basic criteria for identifying these babies include:
     - Birth weight < 2.5 kg (low birth weight)
     - Twins
     - Birth order > 5
     - Artificial feeding
     - Weight < 70% of expected (II and III degrees of malnutrition)
     - Failure to thrive (failure to gain weight in 3 successive months)
     - Children with PEM, diarrhea
     - Working mother/single parent

7. **Ans. (d) 60000 kcal** *[Ref. Park 23/e p527]*
   - *A pregnancy in total consumes about 60,000 Kcal over and above normal metabolic requirements*

Also Remember

On an average normal healthy adult Indian woman gains 12 kg during pregnancy BUT Weight gain of poor Indian women average 6.5 kg

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8. **Ans. (c) 6.5 kg** *[Ref. Park 23/e p527]*
   - On an average *normal healthy adult Indian woman gains 12 kg during pregnancy*; Most of this weight gain is in II trimester (5kg) and III trimester (5kg)
   - *Weight gain of poor Indian women average 6.5 kg*

Also Remember

Chest circumference overtakes head circumference at 9 months - 1 year age BUT in malnourished children of poor Indian women it overtakes at 2 – 3 years age
- *Children born to hypothyroid mothers* have IQ lower by 13 points on an average
- *Women who smoke in pregnancy* deliver babies with an average birth weight less by 170 grams

9. **Ans. (b) Infection of the fetus most commonly occurs in 1st trimester** *[Ref. Park 23/e p528]*
   - When the mother is suffering from syphilis, transmission occurs to fetus, but not before the 4th month of pregnancy; *It is most likely to occur after 6th month, when Langhan's cell layer has completely atrophied*
   - Infection of fetus is most likely to occur when mother has primary or secondary stages of syphilis than late syphilis
   - Clinical features include *Hutchinson's Triad* (deafness, Hutchinson's teeth – centrally notched, widely-spaced peg-shaped upper central incisors and interstitial keratitis), *snuffles* (rhinitis) and *Mulberry Molars* (sixth year molars with multiple poorly developed cusps)
   - Neurological damage with mental retardation is one of the most serious consequences of congenital syphilis
   - Ten daily injections of Procaine Penicillin (600,000 Units) are almost adequate.
   - According to the CDC, 40% of births to syphilitic mothers are stillborn and 30% are infected

Also Remember

MOTHER TO CHILD TRANSMISSION (MTCT):
- *Rubella:* Any trimester; MC and most serious in I trimester
- *Varicella:* Any trimester; MC and most serious in I trimester
- *Syphilis:* Any trimester; More common in Late II trimester or III trimester
- *Toxoplasmosis:* Any trimester; MC in III trimester; Most serious in I trimester
- *Herpes simplex:* During delivery (from infected genital secretions)
- *HIV:* during delivery (30% chance in developing countries, 20% in developed countries), breast feeding (16%)
- *Hepatitis B:* 90% (in presence of HBeAg); 20% (in presence of HBsAg); MC in III trimester and through breast feeding
- *Cytomegalovirus:* Any trimester (MC third trimester)

10. **Ans. (a) Additional intake of 300 Kcal [new guidelines 350 + kcal/d]** *[Ref. K. Park 23/e p636]*

11. **Ans. (c) Maternal mortality rate** *[Ref. K. Park 23/e p557]*

12. **Ans. (d) 2300** *[Ref. K. Park 23/e p633, 636]*

13. **Ans. (b) 150** *[Ref. Manual of Nutritional Therapeutics by Alpers, Taylor, Bier & Stenson, 5/e p90]*

14. **Ans. (d) 500 mg/day** *[Ref. Park 23/e p637]*

LBW

15. **Ans. (b) 500 babies** *[Ref. Park 21/e p494, Park 22/e p495]*
   - *Low Birth Weight (LBW)*: Birth weight less than 2500 grams (<2.5 kg) [WHO]. It includes both pre-term (<37 weeks POG) and full-term (>37 weeks POG) babies
   - *Prevalence of LBW*: 15% (World); *28% (India)*; *If cutoff for LBW is reduced to 2.0 kg*, expected prevalence of LBW in India will be 5.5%
   - *LBW is regardless of gestational age*
   - Depending on the population, the percentage of LBW be based on measurements of atleast 500 babies
   - *Goal for LBW in National Health Policy 1983*: Reduce LBW to <10% by 2000

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Also Remember

- Birth weight of an infant is the *'single most important determinant of its chances of survival, healthy growth and development'*
- *Single best measure to assess physical growth*: Weight
- *Birth weight preferably be measured within*: 1st hour of life (Salter's Scale)
- *Average birth weight in India*: 2.8 kg (2.7 – 2.9 kg)
- *LBW is not a contraindication for any vaccination EXCEPT Hepatitis B*: Hepatitis B vaccine is contraindicated in preterm children with birth weight <2.0 kg
- *Field instrument for measurement of birth weight*: Salter's Scale

16. **Ans. (b) 2.8 kg** *[Ref. Park 23/e p536]*
    - *Average birth weight in India*: 2.8 kg (2.7 – 2.9 kg)
    - *Prevalence of LBW (BW < 2.5 kg) in India*: 28%
17. **Ans. (b) Less than 2500 grams** *[Ref. Park 23/e p536]*
18. **Ans. (a) Birth weight less than 2.5 kg** *[Ref. Park 23/e p536]*
19. **Ans. (a) Continue breast feeding** *[Ref. Park 23/e p225]*
    - *Breast feeding during diarrhoea*:
      - Newborns with diarrhoea who have little or no signs of dehydration can be treated by breast feeding alone
      - Newborns with diarrhoea who have moderate or severe dehydration should be given ORS; breast feeding is continued along with ORS given after each liquid stool
      - Breast feeding rehydrates, provides nutrients to help recovery and prevents further infection
20. **Ans. (c) Small for date babies** *[Ref. Park 23/e p536]*
    - *Babies according to gestational age*:

Type	Gestational age
Pre-term babies	< 37 weeks (< 259 days)
Term babies	37 – 42 weeks (259 – 293 days)
Post-term babies	> 42 weeks (≥ 294 days)

    - *Low birth weight:'Less than 2500 grams IRRESPECTIVE of gestational age'*
      - *Pre-term babies*: Born at < 37 weeks POG
      - *Small-for-date babies*: Born at term or post-term
        1. weigh *'less than 10th percentile for gestational age'*
        2. as a result of IUGR
        3. high risk of dying in neonatal and infancy period
21. **Ans. (d) 4** *[Ref. Park 23/e p523]*
    - *Minimum recommended ante-natal visits*: 4

Visit	Period of gestation^{Q}
First AN visit	Early registration
Second AN visit	14-26 weeks POG
Third AN visit	28-34 weeks POG
Fourth AN visit	36 weeks POG - Term

22. **Ans. (b) 28%** *[Ref. K. Park 22/e P592*

Review Question

23. **Ans. (c) Health education to mother [Other components are: Family Planning, Preventive care, Care in Illness, Growth monitoring]** *[Ref. Park 17/e p383]*
24. **Ans. (c) Height for age** *[Ref. Park 23/e p544]*
25. **Ans. (a) Grade II** *[Ref. Park 23/e p547, 640]*
26. **Ans. (d) $AgNO_3$ eye drop** *[Ref. Park 23/e p533]*

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27. **Ans. (d) Edema in dependent part** *[Ref. Park 23/e p639]*
28. **Ans. (a) Born before 37 weeks** *[Ref. Park 23/e p536]*
29. **Ans. (b) 150 mg/d [Now 300 mg/d]** *[Ref. Park 23/e p637]*
30. **Ans. (c) 100 – 150 mg** *[Ref. Park 23/e p642]*
31. **Ans. (a) 1987** *[Ref. Internet]*
32. **Ans. (b) Lead** *[Ref. Park 23/e p809]*
33. **Ans. (d) MAC** *[Ref. Internet, Park 21/e p600, Park 22/e p602]*
34. **Ans. (b) Vitamin D and calcium** *[Ref. Park 23/e p617]*
35. **Ans. (c) 2500 kCals** *[Ref. Park 23/e p637]*
36. **Ans. (b) 2.5 kg** *[Ref. Park 23/e p536]*
37. **Ans. (a) Less than 10%** *[Ref. Park 21/e p493, Park 22/e p494]*
38. **Ans. (c) 2.5 kg** *[Ref. Park 23/e p535]*
39. **Ans. (a) Prematurity** *[Ref. Park 23/e p535-536]*

MCH INDICATORS

40. **Ans. (a) Tetanus** *[Ref. Park 23/e p566]*

NEONATAL MORTALITY RATE (NNMR):

- Neonatal mortality is the 'most difficult' part of IMR to alter
- *NNMR (India)*: 29 per 1000 LB [2014]
- *MCC of NNMR in India is preterm birth*
- *MCC of ENNMR*: Prematurity and congenital anomalies
- *MCC of LNNMR*: Infections (diarrhea and tetanus)
- $NNMR_{boys} > NNMR_{girls}$
- *Causes of Neonatal mortality (0 – 4 weeks)*:
  - Low birth weight and prematurity
  - Sepsis
  - Hemolytic diseases of newborn
  - Diarrhoeal diseases
  - Tetanus
  - Birth injury and difficult labour
  - Congenital anomalies
  - Conditions of placenta and cord
  - Acute respiratory infections

41. **Ans. (c) Maternal deaths/100000 live births** *[Ref. Park 23/e p557]*
    - *Maternal Mortality ratio (MMR)*: *Maternal deaths expressed as per 100,000 live births*, where a '*maternal death*' is defined as 'death of a woman while pregnant or during delivery or within 42 days (6 weeks) of termination of pregnancy, irrespective of duration or site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes'
    - *Maternal deaths expressed as per 100,000 live births* (earlier it was expressed per 1000 live births but that yielded fractions like 4.08 maternal deaths per 1000 LB; so denominator was extrapolated to 100,000 to make MMR value more sensible)

Also Remember

- *MMR is a ratio*
- *MMR World*: 210 per 100,000 live births.
  - *MCC of MMR (globally)*: Hemorrhage (25%)
- *MMR India*: 167 per 100,000 live births (Assam: 300; Kerala : 61; 2014)
  - *MCC of MMR (India) [SRS 2001-03]*: Hemorrhage (38%)
- *Millennium Development Goal (MDG) 5*: Reduce maternal mortality by three-fourths by 2015
- *RHIME – 'Representative, re-sampled, routine household interview of mortality, with medical evaluation'*: Is a *new method for MMR estimation* introduced in India from 2003 SRS
  - RHIME is an enhanced from of *verbal autopsy*

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42. Ans. (b) Acute lower respiratory tract infections *[Ref. Park 23/e p572]*

- *Child mortality rate, CMR (Under 5 mortality rate, U5MR)*:

$$CMR = \frac{\text{No. of deaths of children less than}}{\text{No. of live births in a year}} \times 1000$$

  - *U5MR (India)*: 52 per 1000 LB [2014]
  - *U5MR (World)*: 43 per 1000 LB [2015]
  - *Single MCC of U5MR or CMR is Pneumonia*
  - Neonatal conditions lead to 44% of total U5MR or CMR:
    1. Infections (MC neonatal condition leading to U5MR)
    2. Preterm births
    3. Asphyxia
- *Child death rate, CDR (1 – 4 year mortality rate)*:

$$CDR = \frac{\text{No. of deaths of children aged 1-4 years in a year}}{\text{Mid year population of children aged 1-4 years}} \times 1000$$

  - *CDR is a more refined indicator of social situation in a country than infant mortality*
  - *Highest risk of death in 1 -4 years age*: 2nd year of life
  - *CDR (India)*: 2.8% of total deaths [2014]
  - *MCC CDR (Developing countries)*: Diarrhoel diseases and respiratory infections
  - *MCC CDR (Developed countries)*: Accidents

Also Remember

- *Millennium Development Goal (MDG) 4*: Reduce child mortality by two-thirds by 2015
- UNICEF considers U5MR or CMR as *'single best indicator of socio-economic development and well being'*
- *Child Survival Rate (CSR) [Child Survival Index]*:

$$CSR = \frac{1000 - U5MR}{10}$$

- *CSR (India)*: 94.8% [2014]

43. Ans. (c) During lactation 8th month *[Ref. Park 23/e p557]*

- *Maternal death*: Is defined as 'Death of a woman while pregnant or during delivery or within 42 days (6 weeks) of termination of pregnancy, irrespective of duration or site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes'
- *Late maternal death*: If death due to obstetric or related complication(s) occurs after 42 days of delivery but within 1 year
  - *Late maternal death is not included in MMR*

  So a mother dying due to any cause at 8 months lactation will not be included in Maternal Mortality Rate (MMR), since it occurs after 6 weeks of delivery

44. Ans. (c); (d) Neonatal mortality is higher among female children as compared to males

[Ref. State of World's Children 2011, UNICEF and NFHS – 3, IIPS]

- *Under five Mortality Rate of India*: 52 per 1000 LB
- *Infant Mortality Rate (IMR) of India*: 40 per 1000 LB
- *Neonatal Mortality Rate (NNMR) of India*: 29 per 1000 LB

  Thus, 40/52 or almost 3/4th of the under-five mortality occurs in the 1st year of life and 29/52 or half of under 5 mortality rate occurs in neonatal period

  Thus 52/1000 or about 1 in 19 children die before they reach the age of five years

Also Remember

- Infant mortality accounts for about 13% of total deaths in India
- Neonatal mortality is the 'most difficult' part of IMR to alter
- When no survey or registration data point is available, *the NNMR is estimated from the under-5 mortality* using a regression adjusted for AIDS

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45. Ans. (b) Infant mortality rate *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p276, Park 23/e p567]*

- *Infant Mortality Rate (IMR) is the second best indicator of socio-economic development of a country*
  - Ultimate solution for lowering IMR lies in socio-economic development [U5MR is even better]
- *IMR is most important indicator of*
  - health status of a community
  - level of living and
  - effectiveness of MCH services in general
- The infant mortality rate is among *'the best predictors of state failure'*
- IMR in India:
  - *Infant Mortality Rate (IMR) is a rate*
  - *MCC of IMR in India*: Low birth rate and prematurity (57%)
  - *MCC of IMR in World*: Pneumonia
  - *IMR (India)*: 40 per 1000 LB (MP/Assam: 54; Goa: 09) [2014]
  - *IMR (World)*: 42 per 1000 LB [2012]
  - *Goal in National Population Policy 2000*: 30 per 1000 LB by 2010

46. Ans. (b) Hemorrhage *[Ref. Park 23/e p557-558]*

- *MCC of Maternal Mortality Rate (MMR in World)*: Obstetric hemorrhage (25%)
- *MCC of MMR in India*: Obstetric hemorrhage (38%)

Also Remember

- *Maternal Mortality Ratio (MMR)*: *Maternal deaths expressed as per 100,000 live births*, where a *'maternal death'* is defined as 'death of a woman while pregnant or during delivery or within 42 days (6 weeks) of termination of pregnancy, irrespective of duration or site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes'

$$\text{MMR} = \frac{\text{No. of maternal deaths in a given year}}{\text{Total no. of live births in the same year}} \times 100{,}000$$

- *MMR World*: 210 per 100,000 live births. Causes of MMR (globally):
  - *Hemorrhage (25%)*
  - *Indirect causes (20%)*
  - *Infection (15%)*
  - *Unsafe abortion (13%)*
  - *Eclampsia (12%)*
  - *Obstructed labour (8%)*
- *MMR India*: 167 per 100,000 live births [2014]. Causes of MMR (India) [SRS 2001-03]:
  - *Hemorrhage (38%)*
  - *Other conditions (34%)*
  - *Sepsis (11%)*
  - *Abortion (8%)*
  - *Obstructed labour (5%)*
  - *Hypertensive disorders (5%)*

47. Ans. (b) 13 % *[Ref. Park 23/e p568]*

- Deaths in the age group 0 – 1 year (infants) account for 13% of total deaths in the country
- About 68% of infant deaths occur in neonatal period. Of these three-fourths 75% occur in first week of life (early neonatal period)
- *The risk of death in infancy is greatest during the first 24 – 48 hours after birth*

Also Remember

- *Infant Mortality Rate (IMR)*:
  - *Infant Mortality Rate (IMR) is a rate*
  - *Is the second best indicator of socio-economic development of a country [BEST : U5MR]*
  - *Is most important indicator of* health status of a community, level of living and effectiveness of MCH services in general

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- The infant mortality rate is among *'the best predictors of state failure'*
- *MCC of IMR in India*: Low birth rate and prematurity (57%)
- *MCC of IMR in World*: Pneumonia

48. Ans. (b) Perinatal mortality *[Ref. Park 23/e p563, 567]*

- *Infant mortality rate (IMR)*: Is the ratio of infant deaths registered in a given year to the total number of live births registered in the same year; IMR is usually expressed as a rate per 1000 live births (LB)

$$\text{IMR} = \frac{\text{No. of neonatal deaths in a given year}}{\text{Total no. of live births in the same year}} \times 1000$$

- *Neonatal mortality rate (NNMR)*: Is the number of neonatal deaths (deaths within completed 28 days after birth) per 1000 live births in that year

$$\text{NNMR} = \frac{\text{No. of neonatal deaths in a given year}}{\text{Total no. of live births in the same year}} \times 1000$$

  - *Early neonatal mortality (ENNM)*: Neonatal mortality in first week (1 – 7 days) of life
  - *Late neonatal mortality (LNNM)*: Neonatal mortality in first to fourth week (8 – 28 days) of life
- *Post-neonatal mortality rate (PNNMR)*: Is the number of neonatal deaths (deaths within completed 28 days after birth) per 1000 live births in that year

$$\text{PNNMR} = \frac{\text{No. of deaths between age 28 days to 1 year i a given year}}{\text{Total no. of live births in the same year}} \times 1000$$

  - Thus, IMR = NNMR + PNNMR = ENNMR + LNNMR + PNNMR
- *Perinatal Mortality rate (PNMR)*: Includes both late fetal deaths (stillbirths) and early neonatal deaths

$$\text{PNMR} = \frac{\text{Late fetal deaths and early neonatal deaths in a given year}}{\text{Total no. of live births in the same year}} \times 10000$$

- Perinatal period is from 28 weeks period of gestation to 7th completed days of life (But the *WHO definition of perinatal period* is from 22 completed weeks gestation to 7th completed days of life)

Also Remember

- *Perinatal Mortality rate (PNMR)*:
  - PNMR is the sum of the fetal mortality and the neonatal mortality
  - PNMR is usually reported on an annual basis
  - *PNMR is a major marker to assess the quality of health care delivery*
  - *PNMR (India): 28 per 1000 LB* [2014]
  - *P List (ICD 10)*: 100 causes of perinatal mortality and morbidity

49. Ans. (a) IMR *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p92, Park 23/e p567]*

- Likely factor affecting infant mortality in contemporary India is inadequate prenatal care and infrequent attendance at delivery
  1. *Sex of the child*: $IMR_{girls} > IMR_{boys}$
     $NNMR_{boys} > NNMR_{girls}$
     $PNNMR_{girls} > PNNMR_{boys}$
  2. *Quality of mothering*: IMR low in good quality of mothering
  3. *Quality of health care*: IMR high in improper obstetric and pediatric care

50. Ans. (c) Low birth weight *[Ref. Park 23/e p564-565]*

- *MCC of NNMR in India is preterm birth* (low birth weight and prematurity)
- *MCC of ENNMR in World*: Prematurity and congenital anomalies
- *MCC of LNNMR in World*: Infections (diarrhea and tetanus)
- *NNMR is directly related with birth weight and gestational age*

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Also Remember

- *MCC of IMR in India*: Low birth rate and prematurity (57%)
- *MCC of IMR in World*: Pneumonia
- *MCC of Child (1 – 4 yr) death rate in developing countries*: Diarrhoel diseases and respiratory infections
- *MCC of Child (1 – 4 yr) death rate in developed countries*: Accidents
- *MCC of Under 5 Mortality Rate (Child Mortality Rate)*: Pneumonia (19%)
- *MCC of Maternal Mortality Rate (MMR in World):* Obstetric hemorrhage (25%)
- *MCC of MMR in India:* Obstetric hemorrhage (38%)

51. **Ans. (a) Per 100,000 live births** *[Ref. Park 23/e p557]*

52. **Ans. (c) 6 weeks** *[Ref. Park 23/e p530]*
    - *Post-natal period*: 0 – 6 weeks post delivery

53. **Ans. (b) Perinatal mortality rate** *[Ref. Park 23/e p563]*

54. **Ans. (a) Madhya Pradesh** *[Ref. Park 23/e p568]*
    - *IMR of few states in India*: [2014]

State	IMR (per 100 live births)
Madhya Pradesh	54
Orissa	51
Uttar Pradesh	50
Assam	54
Bihar	42
Kerala	12
Goa	09

55. **Ans. (d) Under 5 mortality** *[Ref. Park 23/e p572-573]*

56. **Ans. (c) Deaths from 28 weeks to with first week of life** *[Ref. Park 23/e p563]*

57. **Ans. (b) 50** *[Ref. Park 23/e p564]*

    In the given question,

    Total neonatal deaths = Total early neonatal deaths + Total late neonatal deaths = 50 + 150 = 200
    Total live births = Total births – Total stillbirths = 4050 – 50 = 4000
    Thus, Neonatal mortality rate, NNMR = 200/4000 × 1000 = 50 per 1000 live births

58. **Ans. (b) Congenital malformations** *[Ref. K. Park 23/e p569]*
    - Congenital malformations are most common cause of Neonatal mortality in developed countries

59. **Ans. (c) Total number of live births** *[Ref. K. Park 23/e p557]*

60. **Ans. (a) 6 million** *[Ref. WHO Population data, WHO website]*

Under-five Deaths

- Burden: 6.3 million Under-five child deaths in world [2014]
- Leading causes of deaths: [45% associated with PEM]
  - Pneumonia
  - Low birth weigh and Prematurity
  - Birth asphyxia
  - Diarrhoea
  - Malaria

61. **Ans. (d) Prematurity and Congenital malformations** *[Ref. K. Park 23/e p564]*

62. **Ans. (c) >35 cm at birth** *[Ref. K. Park 23/e p563]*

63. **Ans. (a) Low birth weight** *[Ref. K. Park 23/e p567-565]*

64. **Ans. (c) 1000-U5MR/10** *[Ref. K. Park 23/e p576]*

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65. **Ans. (b) 30** *[Ref. K. Park 23/e p564]*

66. **Ans. (c) Postpartum** *[Ref. K. Park 23/e p557-558]*

67. **Ans. (d) Death within 6 months post delivery** *[Ref. Park 23/e p557]*

68. **Ans. (b) 6 weeks** *[Ref. Park 23/e p557]*
    - *Maternal death (WHO):* Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes

69. **Ans. (d) All of these** *[Ref. Park 23/e p579]*

Review Questions

70. **Ans. (c) Total live births weighing over 1000 grams at birth** *[Ref. Park 23/e p563]*

71. **Ans. (a) Less than 1 year** *[Ref. Park 23/e p567]*

72. **Ans. (d) Total death in same year** *[Ref. Park 23/e p572-573]*

73. **Ans. (b) 1-4 year mortality** *[Ref. Park 23/e p572]*

74. **Ans. (a) 100** *[Ref. Park 23/e p567-568]*

75. **Ans. (d) Sepsis and hemorrhage** *[Ref. Park 23/e p557-558]*

76. **Ans. (b) 1000** *[Ref. Park 23/e p562]*

77. **Ans. (a) Prematurity** *[Ref. Park 23/e p563]*

78. **Ans. (b) 1000 live birth** *[Ref. Park 23/e p567]*

BREAST FEEDING

79. **Ans. (a) The maximum milk output is seen at 12 months** *[Ref. Park 23/e p531]*
    - Mean output of breast milk per day (ml) is maximum towards the end of 1st half of lactation (5 – 6 months)

Months of lactation	Mean output (ml)
0 – 2	530
3 – 4	640
5 – 6	730 (Maximum)
7 – 8	660
9 – 10	600
11 – 12	525

    - *Human Milk is richer in iron and has better bioavailability than cow's milk.* Human milk has coefficient of iron uptake around 70%; It is only 30% in cow's milk and infant formulas

Also Remember

- *Nutritive values of milk (per 100 gm)*:

	Cow's milk	Human milk
Lactose (g)	4.4	7.4
Proteins (g)	3.2	1.1
Fat (g)	4.1	3.4
Calcium (mg)	120	28
Iron (mg)	0.2	0.35
Water (g)	87	88
Energy (Kcal)	67	65

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- *Human Milk is richer in Carbohydrate (lactose), Iron and Water content* WHILE Cow's milk is richer in Fat, Protein, Calcium and energy content
  - *Human milk proteins*: More cystine and taurine; less methionine; better digested than cow's milk proteins
  - *Human milk fats*: Higher levels of PUFAs, esp., linoleic acid and a-linoleic acid; better digested and absorbed; low calcium content but better absorbed than cow's milk
  - *Human milk vitamins and minerals*: Human milk is richer in Vitamin A, C; richer in copper, cobalt and selenium; richer in iron and higher bioavailability; high calcium/phosphorus ratio. Human milk has lesser sodium

80. Ans. (a) Exclusive breast-feeding should be continued till 6 months of age followed by supplementation with additional foods *[Ref. Park 23/e p530, 533, 538]*

- WHO recommends, in developing countries, *exclusive breast feeding till 6 months age*
- WHO recommends, in developing countries, *breast feeding till minimum 2 years age*

Also Remember

COLOSTRUM:

- Is the most suitable food immediately after birth of the baby; Regular milk comes 3 – 6 days after birth
- Also known as *'Beestings'*, *'First milk'* or *'Immune Milk'*
- High in carbohydrates, protein, and antibodies and low in fat
- Contains all five immunoglobulins found in all mammals, IgA, IgD, IgE, IgG and IgM

- *Few occasions when breast feeding might harm the infant*:
  - Infants with classic galactosemia
  - Mother has untreated pulmonary tuberculosis
  - Mother is taking certain medications that suppress the immune system
  - Mother has had unusually excessive exposure to heavy metals such as mercury
  - Mother has HIV
  - Mother uses potentially harmful substances such as cocaine, heroin, and amphetamines

81. Ans. (c) More iron *[Ref. Park 23/e p540]*

Also Remember

- *Comparative contents of nutrients in different types of milk:*
  - *Fat content of milk*: Buffalo > Goat > Cow > Human
  - *Protein content of milk*: Buffalo > Goat > Cow > Human
  - *Energy content of milk*: Buffalo > Goat > Cow > Human
  - *Lactose content of milk*: Human > Buffalo > Goat > Cow

82. Ans. (c) 5-6 months *[Ref. Park 23/e p531]*

83. Ans. (c) Lactose *[Ref. Park 23/e p540]*

84. Ans. (a) Maximum output is at 12 months of lactation *[Ref. Park 23/e p531]*

85. Ans. (b) Carbohydrates; (d) Iron *[Ref. K. Park 23/e p540]*

86. Ans. (b) 1 hour of delivery *[Ref. K. Park 23/e P533]*

87. Ans. (d) Neonate should be isolated from mother
[Ref. Management of newborn infant born to mother suffering from tuberculosis: Current recommendations & gaps in knowledge by Mittal, p34]

- In Tuberculosis of Mother, WHO recommends feeding under all circumstances, however, close contact with the baby should be reduced

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Review Questions

88. **Ans. (a) 28 mg** *[Ref. Park 23/e p540]*

89. **Ans. (d) 7:3** *[Ref. Park 21/e p496-97, Park 22/e p498-99]*

90. **Ans. (b) August** *[Ref. Internet]*

GROWTH AND DEVELOPMENT

91. **Ans. (c) 50th percentile for boys** *[Ref. K. Park 19/e p435, 20/e p468]*

92. **Ans. (a) Acute malnutrition** *[Ref. Park 23/e p544]*
    - *Low weight for age*: Is known as *'Underweight' [Acute and Chronic Malnutrition]*
    - *Low weight for height*: Is known as *'Nutritional wasting'* or *'Emaciation'* (Acute Malnutrition)
    - *Low height for age*: Is known as *'Nutritional stunting'* or *'Dwarfing'* (Chronic malnutrition)

Also Remember

FOR CHILDREN:
- *Single best parameter for assessment of physical growth*: Weight (and rate of weight gain)
- *Single most sensitive measure of growth*: Weight
- *Single most reliable criterion of assessment of health and nutritional status*: Weight
- Height is a stable measurement of growth as opposed to body weight
  - *Weight*: reflects only present health status
  - *Height*: indicates events in past also
  - *Age independent parameters for growth assessment*:
  - Weight for height
  - Mid arm circumference (MAC)
  - Thickness of subcutaneous fat
  - Body ratios
    1. *Weight*: Height
    2. *MAC*: Head circumference

93. **Ans. (c) Holds head erect: 6 months** *[Ref. Park 23/e p545]*
    - A normal child holds head erect by 3 months age

Also Remember

- *Behavioral development of children are assessed in 4 fields*: Developmental milestones
  - Motor development
  - Language development
  - Adaptive development
  - Socio-personal development

94. **Ans. (b) 9 kg** *[Ref. Park 23/e p543]*
    - *Average birth weight in India*: 2.8 kg (2.7 – 2.9 kg)
    - *BW doubles at 5 months, triples by 1 year and quadruples by 2 years age*
      - So BW of 3 kg will become 6 kg, 9 kg and 12 kg at 5 months, 1 year and 2 years age respectively
    - *Weight gain pattern in children*:

Age	Weight increments
0 – 3 months	200 grams per week
4 – 6 months	150 grams per week
7 – 9 months	100 grams per week
10 – 12 months	50 – 75 grams per week
0 – 1 year	7.0 kg per year
1 – 2 year	2.5 kg per year
3 – 5 year	2.0 kg per year

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Also Remember

- Weight reflects only present status of the child, whereas height indicates events in the past also
- *Height increase pattern in children*:

Age	Height increments
1st year	25 cm per year
2nd year	12 cm per year
3rd year	9 cm per year
4th year	7 cm per year
5th year	6 cm per year

- *Near-final height attainment*:
  - Indian boys attain 98% of final height by 17.75 years
  - Indian girls attain 98% of final height by 16.5 years

95. Ans. (b) 34 cm *[Ref. Park 23/e p544]*

- At birth the head circumference is about 34 cms, about 2 cms more than the chest circumference
- By 6 – 9 months, Head circumference (HC) = Chest circumference (CC)
- Normal children: CC overtakes HC at around 1 year age
  - Malnourished children: CC may overtake HC at around 3 – 4 years age

Also Remember

- *HC should be measured in Occipito-frontal diameter*, with a fibre-glass tape
- *HC growth velocity in 0 – 3 months age*: 2 cms per month
- *During 1st year there is increase in HC by 12 cms*; Adult head size is achieved by 5 – 6 years age

96. Ans. (d) History of maternal health *[Ref. Park 23/e p545]*

GROWTH CHART:

- *Growth Chart (Road-to-health chart)*: Is a visible display of child's physical growth and development
- *Growth chart is designed for*: Longitudinal follow-up (growth monitoring) of a child
- *Growth chart is generally plotted between*: Weight and Age
- *Growth chart provides information on*:
  - Identification and registration
  - Birth date and birth weight
  - Chronological age
  - Weight-for-age
  - Developmental milestones
  - History of sibling health
  - Immunization procedures
  - Introduction of supplementary foods
  - Episodes of sickness
  - Child spacing (Contraceptive/family planning methods used)
  - Reasons for special care

WHO HOME BASED GROWTH CHART:

- *WHO growth chart has 2 reference curves*:
  - *Upper Reference Curve (URC)*: 50th percentile for boys
  - *Lower Reference Curve (LRC)*: 3rd percentile for girls
- *Road to Health*: Is the space between two growth curves (weight channel). It includes zone of normality for most populations, i.e. 95% of healthy normal children used as a reference fall in this area
- *WHO reference curves are based on*: NCHS Standards (National Centre for Health Statistics, USA)
- *The 3rd percentile (LRC) corresponds to approximately 2 SD below the median of weight-for-age reference value (i.e. URC)*

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Also Remember

- Growth chart was first designed by *'David Morley'* (and later modified by WHO).
- Growth chart is the *'passport to child's health care'*
- *Best available standards of growth*: NCHS standards
- *Direction of growth in a growth chart is more important* than the position of dots
- *Periodic weight record is more useful than a single weight plot*
- *Objective in child care*: To keep the child above 3rd percentile
- *Flattening of a child's plot*: indicates malnutrition
- REFERENCE OR STANDARD VALUES OF GROWTH:
  - *WHO 2006 (MGRS) Child Growth Standards*
  - *Harvard (Boston) standards*
  - *NCHS standards* (WHO reference values)
  - *Indian standards* (ICMR values)

97. Ans. (d) Health education *[Ref. K. Park 17/e p383]*
- *Under fives clinic concept*: Includes
  - Preventive care
  - Care in illness
  - Growth monitoring
  - Family planning (Centre)
  - Health education (Border covering all 4 components)

98. Ans. (a) 3rd percentile *[Ref. K. Park 20/e p468]*

99. Ans. (b) The position of dots is more important than direction *[Ref. Park 23/e p545]*

100. Ans. (a) Low birth weight *[Ref. Park 23/e p534-535]*
- Low birth weight is associated with 'Maternal malnutrition'

101. Ans. (b) Weight *[Ref. K. Park 23/e p543]*

102. Ans. (c) MRGS *[Ref. K Park 23/e p547]*

ICDS GROWTH CHART
- In NRHM and ICDS, Government of India has adopted WHO Child Growth Standards 2006 (also known as MGRS 'Multicentre Growth Reference Study' Standards)
  - Normal zone
  - Below -2 SD: Malnutrition
  - Below -3 SD: Severe Malnutrition

103. Ans. (b) Mid arm circumference *[Ref. Nutrition in Children in Developing Countries by P Choudhary, 1/e p190]*

104. Ans. (c) Height for age *[Ref. K Park 23/e p544]*

105. Ans. (b) 50 percentile for boys and 3 percentile for girls *[Ref. K Park 23/e p545]*

106. Ans. (a) 23% [CORRECT ANSWER 20%] *[Ref. NFHS-3 document, IIPS, Mumbai, Government of India]*

107. Ans. (c) 4 years *[Ref. Pediatric Board Review by Naga, 1/e p1]*

HEIGHT CHANGES POST BIRTH
- Average birth length of an Indian newborn: 50 cm
- Increase of height in 1st year of life: 25 cm
- Height doubles (Become 100 cm) by: 4 years age

108. Ans. (b) Language *[Ref. Park 23/e p545]*

109. Ans. (a) Mirror play *[Ref. Physical Therapy by Kessler, 3/e p67]*
- Mirror play milestone is see at age around 6 months+
- Crawling, Creeping, Pincer grasp are seen in age above 9 months

110. Ans. (b) Height for age *[Ref. Park 23/e p544]*

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Review Questions

111. **Ans. (c) Height for age** *[Ref. Park 23/e p544]*

112. **Ans. (b) Weight for height** *[Ref. Park 23/e p543]*

113. **Ans. (b) 1-5 years** *[Ref. Park 23/e p640]*

114. **Ans. (c) Home based** *[Ref. Park 23/e p545]*

115. **Ans. (a) Keratomalacia** *[Ref. Park 21/e p590-92, Park 22/e p592-94]*

116. **Ans. (b) David Morley** *[Ref. Park 23/e p545]*

117. **Ans. (a) 80% of median weight** *[Ref. Park 23/e p545-546]*

118. **Ans. (a) Used for monitoring growth and development of a child** *[Ref. Park 23/e p545-546]*

119. **Ans. (c) Four** *[Ref. Park 23/e p545-546]*

SCHOOL HEALTH

120. **Ans. (a) Dental ailments** *[Ref. Evaluation Study of Government of India's Intensive Pilot Project of School Health Services, 1980 by Sapru, R, and Pandey, D.C.]*
    - *Commonly detected morbidities in school children (in decreasing order of prevalence)*:
        - Dental defects (180.3 per 1000)
        - Goiter (123.8 per 1000)
        - Malnutrition (123.5 per 1000)

Also Remember

- School age children represent > 25% of total Indian population
- School health committee (1961) in India recommended medical examination of children *'at the time of entry and thereafter every 4 years'* [New NRHM guideline: Once every 6 months]
- *School Eye Screening Programme*:
    - Focus on middle schools (V – VIII classes: 10 – 14 years age group)
    - Teachers to do screening: 1 teacher per 150 students
    - Visual acuity cutoff for referral to PHC: < 6/9
- In 1961, *'Rennuka Roy School Health Committee'* laid the foundations for a comprehensive school health programme in India

121. **Ans. (d) One urinal for 10 students and one latrine for 25 students** *[Ref. Park 23/e p580]*
    - *Healthful school environment:* Suggested minimum standards for sanitation of schools and its environs in India include,
        - *Location*: Away from noisy surroundings; kept fenced
        - *Site*: 5 acres for primary schools; 10 acres for higher elementary schools
        - *Structure*: Exterior walls 10 inch thick and heat resistant
        - *Class room*: 1 class room per 40 students maximum; Per capita space > 10 sq. feet
        - *Furniture*: Single desks of 'minus (–) type'
        - *Doors and windows*: Doors and windows area > 25% of floor area
        - *Color*: Inside color of walls should be white
        - *Lighting*: Natural light from left side
        - *Water supply*: Safe and potable and continuous supply through taps
        - *Lavatory*: 1 urinal per 60 students and 1 latrine per 100 students

122. **Ans. (b) Desks should be of plus type** *[Ref. Park 23/e p580]*

Also Remember

- *Minus (-) type desks*: Desks where sitting table slides under the front portion (writing board)

123. **Ans. (c) 40** *[Ref. Park, 23/e, p580]*

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Review Questions

124. Ans. None (Both are incorrect statements) *[Ref. Logical reasoning]*

125. Ans. None *[Ref. Logical reasoning]*

126. Ans. (a) 1/3; 1/2 *[Ref. Park 23/e p661]*

127. Ans. (b) 'Minus' desk *[Ref. Park 23/e p580]*

128. Ans. (c) 25% *[Ref. Park 23/e p580]*

ICDS, IMNCI, BFHI

129. Ans. (b) Mother to initiate breast feeding within 4 hours of normal delivery *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p177, Park 23/e p540]*

- Help mother **I**nitiate breast feeding *'within half hour of birth'*

Refer to theory

130. Ans. None *[Ref. K. Park 23/e p90]*

- *Ministries to combat malnutrition*:

Programme	Ministry
Vitamin A prophylaxis programme	Ministry of Health and Family Welfare
Prophylaxis against nutritional anemia	Ministry of Health and Family Welfare
Iodine deficiency disorders control programme	Ministry of Health and Family Welfare
Special nutrition programme	Ministry of Social Welfare
Balwadi nutrition programme	Ministry of Social Welfare
ICDS programme	Ministry of Women and Child Development
Midday meal programme	Ministry of Education

Also Remember

- *Employees State Insurance (ESI) Scheme is under*: 'Ministry of Labour'

131. Ans. (d) Neonatal tetanus *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p135-36, Park 23/e p576]*

INTEGRATED MANAGEMENT OF NEONATAL AND CHILDHOOD ILLNESS (IMNCI):

- IMNCI is a *'strategy for reducing morbidity and mortality associated with major causes of childhood illness'*
  - *Curative component includes management of*:
    1. Diarrhoea
    2. Measles
    3. Pneumonia
    4. Malaria
    5. Severe malnutrition and nutritional counseling

Also Remember

- IMNCI is the Indian adaptation of IMCI; major highlights of Indian adaptation are,
  - Inclusion of early neonatal age (0 – 7 days age) in programme
  - Incorporating national guidelines on malaria, anemia, Vitamin-A supplementation and immunization schedule
  - Training of health workers begin with sick young infants up to 2 months
  - Proportion of training time devoted to sick young infant and sick child is almost equal
  - Is skill based
- Currently ICDS is the *'most important scheme in field of child welfare'*; It is *'both a preventive and a developmental effort'*
- *1 Mini-Anganwadi Centre* is for population of 150 – 500 population (rural/urban) or 150 – 300 population (tribal)
- *Kishori Shakti Yojana*: Scheme for adolescent girls in ICDS
- *Wheat Based Nutrition Programme (WBNP)*: The Government of India allocates food grains (wheat and rice) at BPL rates to the States for providing supplementary nutrition to beneficiaries under the ICDS Scheme

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- *UDISHA*: A World Bank assisted countrywide training programme for all ICDS functionaries; 3 main components:
  - Regular training
  - Other training
  - IEC
- *ICDS in India*: Implementation by Ministry of Women and Child Development:
  - ICDS projects sanctioned: 5671
  - ICDS projects functioning: 5422
  - Anganwadis functioning: 578,457

132. Ans. (d) Anganwadi *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p17, Park 23/e p591]*

133. Ans. (b) Community development block *[Ref. Park 23/e p592]*

- Administrative unit of an ICDS project is '*Community Development Block*'; each project covering a population of 1,00,000 (rural/urban) or 35,000 (tribal)
  - 1 CDPO (Community Development Project Officer) is in charge of 4 supervisors (*Mukhyasevikas*) and 100 Anganwadis (each supervisor for 25 Anganwadis)

134. Ans. (b) 700 [CURRENT GUIDELINES: 300-800] *[Ref. K Park 22/e P546]*

135. Ans. (d) USA *[Ref. Birthing Normally After A Caesarean or Two, H Vadeboncoeur, 2/e, 21]*

MOTHER FRIENDLY CHILDBIRTH INITIATIVE (MFCI)

Description: To improve care throughout the childbearing continuum in order to save lives, prevent illness and harm from the overuse of obstetric technologies, and promote health for mothers and babies around the world
Launched: 1996, USA

10 Steps of MFCI:
Step 1: Treat every woman with respect and dignity, providing her right to informed consent and refusal
Step 2: Possess and routinely apply midwifery knowledge and skills related to normal physiology
Step 3: Inform the mother of the benefits of continuous support during labour and birth,
Step 4: Provide drug-free comfort and pain-relief methods during labour
Step 5: Provide specific evidence-based practices proven to be beneficial
Step 6: Avoid potentially harmful procedures and practices that have no scientific support
Step 7: Implement measures that enhance wellness and prevent emergencies, illness, and death of Mother and Baby
Step 8: Provide access to evidence-based skilled emergency treatment for life-threatening complications
Step 9: Provide a continuum of collaborative maternal and newborn care with all relevant health care providers, institutions and organizations
Step 10: Strive to achieve the 10 Steps to Successful Breastfeeding (WHO/UNICEF Baby-friendly Hospital Initiative BFHI)

136. Ans. NONE OF THE CHOICES *[Ref. ICDS document, Ministry of Women & Child Development, Government of India]*

- *Revised norms for free food supplementation under ICDS:*

Category	Existing		Revised	
	Calories (Kcal)	Protein (g)	Calories (Kcal)	Protein (g)
Children (6-72 months)	300	8-10	500	12-15
Severely malnourished children (6-72 m)	600	20	800	20-25
Pregnant women and Nursing mothers	500	15-20	600	18-20

137. Ans. (c) 6 *[Ref. Park 23/e p591]*

Review Questions

138. Ans. (a) Covers population of 5000 *[Ref. Park 23/e p592]*

139. Ans. (c) Prevention of iodine deficiency disorders *[Ref. Park 23/e p590-592]*

140. Ans. (b) Formal education *[Ref. Park 23/e p590-592]*

141. Ans. (a) Tetanus *[Ref. Park 23/e p576]*

142. Ans. (b) 1000 [Now 400–800] *[Ref. Park 23/e p592]*

143. Ans. None [Now 500 Kcal + 12 – 15 g proteins] *[Ref. Park 23/e p591]*

144. Ans. (c) Two months *[Ref. Park 23/e p576]*

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NEONATAL SCREENING

145. Ans. (b) Phenylketonuria *[Ref. Park 23/e p535]*

GUTHRIE TEST:

- *Guthrie Test*: Is done in neonates for mass screening of Phenylketonuria (PKU)
- *Guthrie test was the first screening test used in neonates*
- *Blood sample* is collected by heel prick of the baby 7 -10 days after birth
- *Guthrie Test is negative* in first 2 – 3 days of life
- *Guthrie test can detect* PKU, Galactosemia and Maple syrup urine disease
- *Chemicals detected*: Phenylalanine, Phenylpyruvate and Phenyllactate
- *It is a semi-quantitative test*

Also Remember

- Neonatal Screening is primarily a Secondary Level of Prevention
- *Most common neonatal disorder to be screened is Neonatal hypothyroidism (NNH)*
- *PKU is an autosomal recessive trait* with a frequency of 1 in 10,000 births
- *Enzyme deficient in PKU*: Phenylalanine hydroxylase
- *Treatment of PKU*: restricting or eliminating foods high in phenylalanine, such as breast milk, meat, chicken, fish, nuts, cheese, legumes and other dairy products
- Currently, Guthrie test has been replaced by *Tandem mass Spectrometry*

146. Ans. (a) Neonatal hypothyroidism *[Ref. Park 23/e p535]*

- *Most common neonatal disorder to be screened is Neonatal hypothyroidism (NNH)*
- *Blood sample* is collected from Cord's Blood
- *Test involves measurement of* T_4 or TSH both simultaneously. As a single method, T_4 is more useful (greater precision and reproducibility)

Also Remember

- NNH has a frequency of 1 in 4000 births
- *The most common cause of congenital hypothyroidism is iodine deficiency*
- Treatment of NNH consists of a daily dose of thyroid hormone (thyroxine) by mouth

MISCELLANEOUS

147. Ans. (b) Volume >1 ml [NEW GUIDELINES > 1.5 ml] *[Ref. Internet; www.who.int]*

Also Remember

- *Aspermia*: Absence of semen
- *Azoospermia*: Absence of sperms
- *Oligospermia*: Low no. of sperms
- *Asthenozoospermia*: Poor sperm motility
- *Teratozoospermia*: Sperms carry more morphological defects than usual

148. Ans. (b) Adolescent girl's scheme under ICDS *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p17 and Park 21/e p545, Park 22/e p443]*

KISHORI SHAKTI YOJANA (KSY):

- KSY is rename of *'Adolescent Girl's Scheme'* under ICDS (Integrated Child Development Services)
- *Aim of KSY*:
  - To improve the nutritional and health status of adolescent girls
  - To promote self-development, awareness of health, hygiene, nutrition, and family life and child care
  - KSY covers 2000 ICDS projects

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149. Ans. (c) ORS *[Ref. Park 21/e p529, Park 22/e p531]*

- Oral Rehydration Therapy (ORT), a cheap and effective way to tackle mortality from diarrhoea is *'the discovery of the century'*

Also Remember

- *Smallpox vaccine* was the first successful vaccine ever to be developed; It was first perfected in 1796 by *'Edward Jenner'*
- *Penicillin*: The discovery of penicillin is usually attributed to Scottish scientist *'Sir Alexander Fleming'* (1928) and the development of penicillin for use as a medicine is attributed to the Australian Nobel Laureate *'Howard Walter Florey'*
- *Zidovudine* (INN) or azidothymidine (AZT) (also called ZDV) is an antiretroviral drug, the first approved for treatment of HIV

150. Ans. (c) Iron supplements and observation *[Ref. Park 23/e p498]*

Also Remember

- *Bleeding on IUD insertion*: Reassure + Iron supplementation
- *Pain on IUD insertion*: Remove the IUD
- *Pregnancy with IUD-in-situ*:
  - Legally induced abortion
  - If woman wants to continue pregnancy: Remove IUD by pulling threads
  - If signs of intra-uterine infection: Evacuation under broad spectrum antibiotic cover

151. Ans. (b) 105 g/L *[Ref. Internet]*

Also Remember

- *Cut-off points for diagnosis of anemia (WHO)*:

Group	Hb (g/dl)	MCHC (%)
Adult males	13	34
Adult females, non-pregnant	12	34
Adult females, pregnant	11	34
Children, 6 m – 6 y	11	34
Children, 6 – 14 y	12	34

- *12 by 12 Initiative*: The initiative was launched by MoHFW, GOI; FOGSI and UNICEF on April 24, 2007
  - *Main Objective*: To ensure that every child have a healthy hemoglobin of 12 gm% by the age of 12 years

152. Ans. (d) A Rh –ve multipara mother aged 30 years with two live healthy boys *[Ref. Park 23/e p578]*

- *Amniocentesis*: Amniotic Fluid Test or AFT is a medical procedure used in prenatal diagnosis of genetic risk factors; In AFT, a small amount of amniotic fluid, which contains fetal tissues, is extracted from the amnion or amniotic sac surrounding a developing fetus, and the fetal DNA is examined for genetic abnormalities
- Amniocentesis can be performed *'usually after the 14th week of pregnancy'* (and not before 12 weeks of POG)
- *Indications for Amniocentesis*:
  - Advanced maternal age (> 35 years) for risk of Down's Syndrome
  - Previous child with Down's Syndrome or other chromosomal anomalies
  - Parents with known chromosomal translocation
  - Previous child with a metabolic defect (neural tube defects, anencephaly and spina bifida) – raised alpha fetoprotein
  - Sex determination is warranted (history of sex linked genetic diseases)

Also Remember

- Through amniocentesis, the *'three most common abnormalities tested'* for are:
  - Down's syndrome
  - Trisomy 18
  - Spina bifida

153. Ans. (c) Adoption and Foster home placement *[Ref. Park 23/e p589]*

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CHILD PLACEMENT:

- *Orphanages*: For children who have no home or cannot be taken care of by their parents
- *Foster Homes*: Several types of facilities for rearing children other than in natural families
- *Adoption*: Legal adoption confers upon child and the adoptive parents, rights and responsibilities similar to that of natural parents
- *Borstals*: *Borstal*: Boys over 16 years who are too difficult to be handled in a certified school or have misbehaved there, are sent to a Borstal. Borstal, as an institution, falls between a certified school and an adult prison
  - A borstal sentence is usually for 3 years, and is regarded as a method of training and reformation
- *Remand Homes*: Child is placed under the care of doctors, psychiatrists and other trained personnel to improve the mental and physical well being of the child

Also Remember

- Law relevant to adoption in India: *'The Hindu Adoptions and Maintenance Act, 1956'*

154. Ans. (c) Borstal *[Ref. Park 23/e p589]*

155. Ans. (a) 2-3 % of newborns *[Ref. Park 21/e p531, Park 22/e p533]*

- *Congenital disorders*: Those diseases that are substantially determined before or during birth and which, in principle, are recognizable in early life
- *Incidence of congenital disorders (World)*: 30 – 70 per 1000 live births
  - *MC disorders* are of cardiovascular system and nervous system
- *Birth defects in Indian newborns* are seen in 2.5%. The figure rises to 4% if they are followed upto age of 5 years
  - *MC birth defect in North India*: Neural tube defects or spina bifida
  - *MC birth defect in rest of India*: Musculoskeletal disorders

156. Ans. (b) Borstal *[Ref. Park 23/e p589]*

157. Ans. (a) Article 24; (e) Article 45 *[Ref. Park 21/e p508, Park 22/e p510]*

- *Articles on Child rights in our Constitution*:

Article	Details
Article 24	Prohibits employment of children below 14 years in factories
Article 24	Prevents abuse of children at tender age
Article 24	Provides for free and compulsory education for all children till 14 yrs age

Also Remember

- *NPAC 2005 definition of Child (adopted by India)*:
  - All persons upto the age of 18 years
  - All rights apply to all age-groups, including before birth
- *National Policy 1974 mandate*: State takes responsibility for children 'both before and after birth'

HEALTH OF ADOLESCENTS:

- *Definitions*:
  - *Adolescents*: 10 – 19 years age
  - *Youth*: 15 – 24 years age
  - *Young people*: 10 – 24 years age

158. Ans. (b) Child trafficking *[Ref. K Park 23/e P588]*

UJJAWALA SCHEME:

- *Description:* A Comprehensive Scheme for Prevention of Trafficking and Rescue, Rehabilitation and Re-integration of Victims of Trafficking for Commercial sexual exploitation
- *Ministry:* Ministry of Women and Child Development
- *Launch:* 4th December 2007

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- *Target Group/ Beneficiaries (**V-V**):* Women and children, who are
  - **Vulnerable** to trafficking for commercial sexual exploitation
  - **Victims** of trafficking for commercial sexual exploitation
- Main Components [**Mnemonic: PR⁴**]
  - **P**revention
  - **R**escue
  - **R**ehabilitation
  - **R**e-Integration
  - **R**epatriation (Cross-border)

159. Ans. (c) Remand home *[Ref. K Park 23/e P589]*

160. Ans. (c) Free nutritional supplements *[Ref. Park 23/e p537]*
- KANGAROO MOTHER CARE for prevention of neonatal hypothermia in low birth weight/premature newborns:
  - Skin-to-skin positioning of newborn on mother's chest
  - Adequate nutrition through breast feeding
  - Early discharge and ambulatory care
  - Support for mother and family for child care

161. Ans. (c) Remuneration *[Ref. Park 23/e p588]*

162. Ans. (c) 1, 2 and 3 *[Ref. World Conflicts by Cathy, 1/e p78]*

Review Question

163. Ans. (c) 20 weeks *[Ref. Park 23/e p506]*

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CHAPTER

9

Nutrition and Health

ENERGY AND PROTEIN REQUIREMENTS

Nutrients in Diet

- *Macronutrients*: Proximate principles which form the bulk of the diet[Q]
  - Carbohydrates
  - Fats
  - Proteins
- *Micronutrients*: Vitamin and Minerals (which are required in small quantities).
  - *Major minerals*: Sodium, Potassium, Magnesium, Calcium, Phosphorus
  - *Trace elements*: Iron, Iodine, Fluorine, Zinc, Copper, Cobalt, Selenium, Chromium, Manganese, Molybdenum, Nickel, Tin, Silicon, Vanadium
  - *Trace contaminants (no known function in body)*: Lead, Mercury, Barium, Boron, Aluminium[Q].

I Proximate principles:
- Carbohydrates
- Fats
- Proteins

Proximate Principles of Diet

- *Energy yield of macro-nutrients (Proximate principles)*:[Q]

Nutrient	Energy yield
Carbohydrates	4 Kcal per gram (17 KJ)
Proteins	4 Kcal per gram (17 KJ)
Fats	9 Kcal per gram (37 KJ)

- Carbohydrates, fats and proteins form the main bulk of food; thus they are known as *'Macronutrients'* or *'Proximate principles'*
- In *'Balanced Diet'*,
  - Proteins should constitute 10-15% of total daily energy intake[Q]
  - Fats should constitute 15-30% of total daily energy intake[Q]
  - Carbohydrates constitute remaining 50-70% of energy.

I In 'Balanced Diet':
- Proteins should constitute 10-15%
- Fats should constitute 15-30%

Recommended Daily Energy and Protein Intake [New Guidelines 2011]

Group	Particulars	Energy (Kcal/d)	Proteins (g/d)
Adult Male	Sedentary worker[Q]	2320	60
	Moderate Worker	2730	60
	Heavy Worker	3490	60
Adult Female	Sedentary worker[Q]	1900	55
	Moderate Worker	2230	55
	Heavy Worker	2850	55
	Pregnancy[Q]	+350	+23
	Lactation (0 – 6 m)[Q]	+600	+19
	Lactation (6 – 12 m)	+520	+13
Infants	0- 6 months[Q]	92/kg	1.16/kg
	6-12 months[Q]	80/kg	1.69/kg

I Pregnancy[Q] +350 kcal/d
Lactation (0 – 6 m)[Q] + 600 kcal/d

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Consumption Units

- *Definition*: A 'Consumption Unit' is a coefficient of dietary intake, which varies between individuals based on the basis of their age, sex and physical activity[Q]
  - Appraisal of dietary intake of very family by weighment method is worked out in terms of consumption units
- *Consumption Unit Coefficients (CUC)*:

Group	Particulars	CUC
Adult Male	Sedentary worker[Q]	1.0
	Moderate worker	1.2
	Heavy worker	1.6
Adult Female	Sedentary worker[Q]	0.8
	Moderate worker	0.9
	Heavy worker	1.2
Adolescents	12 – 21 years	1.0
Children	9 – 12 years	0.8
	7 – 9 years	0.7
	5 – 7 years	0.6
	3 – 5 years	0.5
	1 – 3 years	0.4

Recommended Dietary Allowance (RDA)

- *Definition*[Q]: Recommended Dietary Allowance (RDA): Is a level of intake corresponding to Mean + 2 Standard Deviation, which covers requirement of 97.5% of population
  - RDA is safe level of intake which is likely to be inadequate in not more than 2.5% population
  - RDA is decided by a panel of experts and is based on scientific research
- *RDA is often higher than the recommended minimum requirement*: RDA includes both daily requirement and some additional requirement for periods of growth or illness
  - RDA is based on Estimated Average Requirement
- RDA 'safe level approach' is not used for energy since excess energy intake is undesirable[Q]
  - *For energy*: only mean or average requirement is defined as RDA.

I RDA covers requirement of 97.5%

I RDA 'safe level approach' is not used for energy

Reference Indian Man & Woman[Q]

	Reference Indian Man	Reference Indian Woman
Age*	18-29 years	18-29 years
Weight	60 kg[Q]	55 kg[Q]
Height	1.73 metres	1.61 metres
BMI	20.3	21.2
Others	Free from disease, fit for active work; engaged in 8 hours of occupation (usually moderate activity), 8 hours in bed, 4-6 hours in sitting & moving about and 2 hours in walking and in active recreation or household duties[Q]	

(**Calculation* Average of values of age category 18-19 y, 20-24 y and 25-29 y).

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PROTEINS

Protein Quantity of Food Items

Food Item	Protein content (gm % per 100 gm)
Soyabean[Q]	43
Pulses	22-25
Fish	21
Meat	20
Egg (hen)	13
Wheat	12
Rice	7
Milk (cow)	3

Protein Energy Ratio (PE Ratio)

- Assessment of protein quantity is done by 'Protein-Energy Ratio' (PE)[Q]

$$\text{PE percent} = \frac{\text{Energy from protein}}{\text{Total energy in diet}} \times 100$$

  - It is recommended that protein should account for approximately 15 - 20% of total daily energy intake
  - If PE is less than 4 percent, then the subject will be unable to eat enough to satisfy protein requirements.

- *Recommended PE Ratios:*

Group	PE Ratio (%)
Reference adult man	8.3
Reference adult woman	9.1
Pregnant woman	10.4
Lactating woman	10.9
Adolescent 16 – 18 yr boys	11.4
Adolescent 16 – 18 yr girls	11.7

- *PE Ratios of food items:*

Food Item	PE % (Kcal)
Fish[Q]	80
Milk (cow)	20
Dal (pulses)	24
Rice	8

Methods of Assessing Protein Quality

- Digestible Indispensable Amino Acid Score (DIAAS):
  - FAO has recommended DIAAS replace PDCAAS as preferred method of measuring protein quality[Q]

$$\text{DIAAS \%} = \frac{\text{Digestible dietary indispensable amino acid mg in 1 g of dietary protein}}{\text{Same dietary indispensable amino acid mg in 1 g of reference protein}} \times 100$$

- *Protein Digestibility Corrected Amino Acid Score (PDCAAS)*:
  - PDCAAS is Amino Acid Score with an added digestibility component
  - PDCAAS is closely compares to determinations done with animals[Q]
- *Amino Acid Score (AAS)*:
  - A chemical technique considered fast, consistent, and inexpensive

I DIAAS is the 'current accepted measure of protein quality'

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  - It measures the indispensable amino acids present in a protein and compares the values with a reference protein
  - The protein is rated based upon the most limiting indispensable amino acid
- *Protein Efficiency Ratio (PER)*:
  - It represents the ratio of weight gain to the amount of protein consumed
  - This method may not be applied to growing infants and children
  - Also PER measures growth but not maintenance so it may be of limited use in determining the protein needs of adults
- *Biological Value (BV)*:
  - Measures the amount of nitrogen retained in comparison to the amount of nitrogen absorbed
  - The BV and the NPU methods reflect both availability and digestibility and they give an accurate appraisal of maintenance needs
- *Net Protein Utilization (NPU)*: The ratio of the nitrogen used for tissue formation versus the amount of nitrogen digested.

Net Protein Utilization (NPU)

- *Net Protein Utilization (NPU):* Is the proportion of ingested proteins that is retained in the body under specified conditions for the maintenance and/or growth of the tissues
  - In calculating protein quality, *1 gram of protein is assumed to be equivalent to 6.25 grams of nitrogen*[Q]
- *Importance:* NPU is the best indicator of protein quality for recommending the dietary protein requirement[Q]
  - *Net Protein Utilization (NPU)*: Provides a complete expression of *'protein quality'*

I NPU is a good indicator of protein quality

I $$NPU = \frac{BV \times DC}{100}$$

$$NPU = \frac{\text{Nitrogen retained by body}}{\text{Nitrogen intake}} \times 100$$

$$NPU = \frac{\text{Biological value} \times \text{Digestibility coefficient}}{100}$$

- *NPU of selected food items*:

Food Item	Net Protein Utilization
Egg (hen)	96*
Milk (cow)	81
Meat	79
Fish	77
Rice	65
Soyabean	55
Wheat	51
Grams (pulses)	45-50
Groundnut	50

I NPU of egg is 96. Egg is 'reference protein'

(*NPU of egg is 96. Since egg is *'reference protein'*, its NPU is taken as 100 for comparison)

Limiting Amino Acids

- *Definition:* Amino acids most deficient in proteins of a food item are 'Limiting amino acids'

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Food Item	Limiting Amino Acid(s)
Cereals[Q]	Threonine (& Lysine)
Pulses[Q]	Methionine (& Cysteine)
Maize[Q]	Tryptophan (& Lysine)

- *Supplementary action of proteins*[Q]: Deficiency develops due to only consumption of a particular type of food item with limiting amino acids (for e.g. wheat); Thus two or more food items are eaten together so that their proteins supplement one another; this is known as 'Supplementary Action of Proteins'.

I

10 EAA **[Mnemonic: PVT TIM HALL]**

Essential Amino acids

- *Essential Amino Acids (EAA)*: Amino acids which are not synthesized in adequate amounts in the human body; so they have to be supplemented in diet from outside to prevent deficiency[Q]
- 10 EAA [**Mnemonic: PVT TIM HALL or** ***A****ny* ***H****elp In* ***L****earning* ***T****hese* ***L****ittle* ***M****olecules* ***P****roves* ***T****ruly* ***V****aluable*] [Q]
  - **P**henylalanine
  - **V**aline
  - **T**hreonine
  - **T**ryptophan
  - **I**soleucine
  - **M**ethionine
  - **H**istidine (Semi-essential)
  - **A**rginine (Semi-essential)
  - **L**eucine
  - **L**ysine

FATS AND CARBOHYDRATES

Essential Fatty Acids (EFA)

- *Essential Fatty Acids (EFA):* Are those that cannot be synthesized completely in human body; they can only be supplemented from the food[Q]
  - Most important EFA: Linoleic Acid, which serves as a basis for production of other EFA[Q]
  - EFA deficiency lead to 'Phrenoderma' (Toad Skin)[Q]: Rough rash like eruptions on back and sides of arms and legs, back, and buttocks
- *Types of EFAs:*

Type of fatty acids	Type of chain	Examples
ω-3 Fatty Acids	Short chain	α-Linolenic acid
	Long chain	Eichosapentanoic acid Docosahexaenoic acid
ω-6 Fatty Acids	Short chain	Linoleic Acid
	Long chain	Arachidonic acid γ-Linolenic acid Dihomo-γ-Linolenic acid

  - *ω-9 Fatty Acids* are non-essential in human beings
  - *ω-3 Fatty Acids* are derived from α-Linolenic acid; *ω-6 Fatty Acids* are derived from Linoleic Acid and *ω-9 Fatty Acids* are derived from Oleic Acid[Q]
  - EFA were earlier known as *'Vitamin F'*
  - *ω-3 Fatty Acids* have been shown to reduce the incidence of Coronory Heart Disease
  - *ω-6: ω-3 Fatty Acids ratio in diet* is ideally recommended to be 1:1 to 4:1 (IDEAL FAT[Q])

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- *Dietary sources of EFA*:

EFA	Dietary source	% content
Linoleic Acid	Safflower oil Corn oil Sunflower oil Soyabean oil	73 57 56 51
Arachidonic Acid	Meat, Eggs Milk (fat)	0.5 0.5
Linolenic Acid	Soyabean oil	7
Eichosapentanoic Acid	Fish oil	10

I Richest source of EFA is Safflower Oil

- *Fatty acid content of different fats (%)*[Q]:

Fats	SFA*	MUFA*	PUFA*
Safflower oil	10	15	75
Sunflower seed oil	8	27	65
Soya bean oil	14	24	62
Margarine	25	25	50
Groundnut oil	19	50	31
Palm oil	46	44	10
Butter	60	37	3
Coconut oil	92	6	2

VITAMINS

Vitamins and Vitamin Deficiencies

Vitamins	Chemical Name(s)	Deficiency[Q]
Vitamin A	Retinol Retinoid Carotenoid	Xerophthalmia[Q]
Vitamin B_1	Thiamine	Beri-beri[Q] Wernickes Korasoff Psychosis[Q]
Vitamin B_2	Riboflavin	Ariboflavinosis
Vitamin B_3	Niacin Niacinamide	Pellagra[Q]
Vitamin B_5	Pantothenic Acid	Burning feet Syndrome[Q]
Vitamin B_6	Pyridoxine Pyridoxamine Pyridoxal	Anemia
Vitamin B_7	Biotin	Dermatitis, Enteritis
Vitamin B_9	Folic Acid, Folinic Acid	Megaloblatic Anemia[Q] Neural tube defects[Q]
Vitamin B_{12}	Cyanocobalamin Hydroxycobalamin Methylcobalamin	Megaloblastic Anemia[Q]
Vitamin C	Ascorbic Acid	Scurvy[Q]
Vitamin D	Ergocalciferol Cholecalciferol	Rickets[Q] Osteomalcia
Vitamin E	Tocopherols Tocotrienols	Hemolytic anemia in newborn[Q]
Vitamin K	Phylloquinone Menaquinone, Menadione	Hemorrhagic disease of new born[Q]

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I Vitamin A[Q]: 600 mcg retinol

Recommended Daily Requirements of Vitamins

Vitamin	Recommended daily requirement
Vitamin A[Q]	600 mcg retinol
Vitamin B_1 (Thiamine)	0.5 mg per 1000 Kcal of energy intake
Vitamin B_2 (Riboflavin)	0.5 mg per 1000 Kcal of energy intake
Vitamin B_3 (Niacin)	6.6 mg per 1000 Kcal of energy intake
Vitamin B_5 (Pantothenic Acid)	10 mg
Vitamin B_6 (Pyridoxine)	2 mg
Vitamin B_9 (Folic Acid)	100 mcg
Vitamin B_{12} (Cobalamin)	1 mcg
Vitamin D[Q]	100 IU (2.5 mcg calciferol)
Vitamin E (Tocopherol)	0.8 mg per gm of essential fatty acids
Vitamin K[Q]	0.03 mg per kg

Vitamin A

- *Recommended daily requirement of Vitamin-A*:

Group		Retinol (mcg) OR	β-carotene (mcg)
Adults	Man[Q] Woman Pregnancy[Q] Lactation	600 600 800 950	4800 4800 6400 7600
Infants	0 –12 months	350	2800
Children	1 – 6 years 7 – 12 years	400 600	3200 4800
Adolescents	13 – 19 years	600	4800

I Strength of Vitamin-A solution: 1 lac IU per ml

- *Under National Immunization Schedule (NIS), Vitamin-A is given;*[Q]
  - 1 lac IU at 9 months age (along with measles vaccine),
  - 2 lac IU every six months thereafter, till the age of 5 years (at 18, 24, 30, 36, 42, 48, 54, 60 months of age)
  - A total of 17 lac IU is given[Q]
  - Vitamin-A is administered by a *'2 ml spoon'*[Q]
  - *Strength of Vitamin-A solution: 1 lac IU per ml*[Q]

Vitamin A Deficiency: Xerophthalmia

I *'First clinical sign' of Vitamin-A deficiency*[Q]: Conjunctival xerosis

I *'First clinical symptom' of Vitamin-A deficiency*[Q]: Night blindness

- *Ocular manifestations of Vitamin-A deficiency*[Q]: 'Xerophthalmia' (Dry Eye)
- Xerophthalmia is most common in children aged 1-3 years
  - *'First clinical sign' of Vitamin-A deficiency*[Q]: Conjunctival xerosis
    *Conjunctival xerosis in Xerophthalmia has a characteristic appearance of 'emerging like sand banks at receding tide'
  - *'First clinical symptom' of Vitamin-A deficiency*[Q]: Night blindness
  - 'Bitot's Spots' are triangular, pearly-white or yellowish, foamy spots on bulbar conjunctiva, on either side of cornea; In young children they indicate Vitamin-A deficiency, whereas in adults they are often inactive sequelae of earlier disease
  - Corneal xerosis is a serious manifestation of Vitamin-A deficiency
  - Keratomalacia (liquefaction of corne(a) is a 'grave medical emergency'
- *Extraocular manifestations of Vitamin-A deficiency*: Follicular hyperkeratosis, anorexia, growth retardation, etc
- *Prevalence criteria for determining the Xerophthalmia problem in a community*: (Preschool children 6 months- 6 years).

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Criteria	Prevalence
Night blindness[Q]	> 1.0%
Bitot's spots[Q]	> 0.5%
Corneal xerosis/ corneal ulceration/ keratomalacia	> 0.01%
Corneal ulcer	> 0.05%
Serum retinol (< 10 mcg/dl)	> 5.0%

- *WHO recommended strategy for prevention of Xerophthalmia*:
  - *Short term action*: Vitamin-A prophylaxis to vulnerable groups.

Individual	Dose* (IU)	Timing
Child <12 months age	1,00,000	Once every 4 – 6 months
Child >12 months age	2,00,000	Once every 4 – 6 months
Newborn	50,000	At birth
Women 15 – 49 years	3,00,000	Within 1 month of delivery
Pregnancy and Lactation	5000 OR	Every day
	20,000	Once every week

(* Oral dose of *retinol palmitate*, where 55 mg = 1,00,000 IU)

  - *Medium term action*: Fortification of certain foods with Vitamin-A.
  - *Long term action*: Promotion of consumption of green leafy vegetables, promotion of breast feeding for as long as possible, improvements in environmental health, immunization against measles, prompt treatment of diarrhoel infections, social and health education, etc.

Vitamin B3 (Niacin) Deficiency: Pellagra

- Pellagra occurs due to Vitamin B3 (Niacin) deficiency[Q]
- *Pellagra is characterized by 4 D's*[Q]:
  - Diarrhoea
  - Dementia
  - Death
  - Dermatitis

  *Skin rash in pellagra may appear as pigmented and scaly in areas exposed to sunlight. Esp. neck when it is known as 'Casal's Necklace'[Q]
- *Pellagra is common in maize/jowar eating populations*:
  - Limiting amino acid in maize is Tryptophan[Q]
  - 60 mg Tryptophan is converted to 1 mg Niacin in the body[Q]
  - *'Excess of leucine'* in such populations appears to interfere in conversion of tryptophan to niacin[Q]

I Pellagra is characterized by 4 D's:
- Diarrhoea
- Dementia
- Death
- Dermatitis

Vitamin B9 (Folic Acid)

- Body stores of folate are not large (about 5 - 10 mg), therefore folate deficiency can develop quickly
- *Recommended daily intake values of folate*:

Group	Intake per day
Healthy adults	200 mcg
Pregnancy[Q]	500 mcg
Lactation	300 mcg
Children	100 mcg

- *An adult tablet of IFA contains*[Q]: 100 mg elemental Iron and 500 mcg Folic acid (to be given for 100 days minimum in pregnancy)
- *A pediatric tablet of IFA contains*[Q]: 20 mg elemental Iron and 100 mcg Folic acid (to be given for 100 days minimum every year till 5 years age of child)

I An adult tablet of IFA contains[Q]: 100 mg elemental Iron and 500 mcg Folic acid

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I

Serum ferritin[Q]: 'Most sensitive tool for evaluation of iron status'

IRON

Iron Status Evaluation

- *Hemoglobin concentration:* A relatively insensitive index of nutrient depletion
- *Serum iron concentration:* Normal range is 0.80-1.80 mg/L
- *Serum ferritin[Q]:* 'Most sensitive tool for evaluation of iron status', especially in populations with low prevalence of anemia
- *Serum transferrin saturation:* Normal value is 30%

Cut-off for Diagnosis of Anemia (WHO)[Q]

Group	Hb (g/dl)	MCHC (%)
Adult males	13	34
Adult females, non-pregnant	12	34
Adult females, pregnant	11	34
Children, 6 m – 6 y	11	34
Children, 6 – 14 y	12	34

Iron Requirements (mg per day) [New Guidelines][Q]

Groups	Particulars	Iron to be absorbed (mg per day)
Adult male		0.84
Adult female	Menstruating[Q] Pregnancy 1st half Pregnancy 2nd half[Q] Lactation Post menopause	1.65 0.8 2.80 1.65 0.7
Infant[Q]	6 – 12 months	0.7
Children	1 – 12 years	0.6
Adolescent	Boys 13 – 16 years Girls 13 – 16 years	1.6 1.4

Iron Intake Recommended (RDA in mg per day) [New Guidelines]

Groups	Particulars	Iron intake (mg per day)
Adult male[Q]		17
Adult female	Menstruating[Q] Pregnancy[Q] Lactation	21 35 21
Infant	6 – 12 months	5
Adolescent	Boys 13 – 15 years Girls 13 – 15 years Boys 16 – 18 years Girls 16 – 18 years	32 27 28 26

National Iron PLUS Initiative

- **Description:** an attempt to look at Iron Deficiency Anaemia in which beneficiaries will receive iron and folic acid supplementation irrespective of their Iron/Hb status
- **Importance:** Will bring together existing programs (IFA supplementation for: pregnant and lactating women and; children in the age group of 6–60 months) and introduce new age groups.

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IODINE AND FLUORINE

Fluorine

- *Recommended level in drinking water in India*[Q]: 0.5 - 0.8 mg/litre (ppm)
  - In temperate countries where water intake is low, the optimum level of fluorides in drinking water is accepted as 1-2 mg/litre
  - *Major source of fluorine to man*[Q]: Drinking water
- *'Fluorine is a double edged sword'*: Inadequate intake is associated with 'dental caries' whereas excess intake with 'dental and skeletal fluorosis'
  - *Level > 1.5 ppm*: Dental fluorosis (mottling[Q])
  - *Level 3.0 - 6.0 ppm*: Skeletal fluorosis
  - *Level > 10.0 ppm*: Crippling fluorosis

I Recommended level in drinking water in India[Q]: 0.5 - 0.8 mg/litre (ppm)

I 'Fluorine is a double edged sword'

Fluorosis

- Dental fluorosis occurs when excess fluoride is ingested during first 7 years of life (years of tooth calcification)
  - It occurs at levels above 1.5 mg/litre intake
  - It is characterized by 'Mottling', which is best seen on incisors of upper jaw[Q]

Nalgonda Technique

- 'Nalgonda Technique' has been developed by National Environmental Engineering Research Institute (NEERI), Nagpur for defluoridation of water[Q]
- *It involves addition of (in sequence*[Q]):
  - Lime[Q]
  - Alum (major role)[Q]
  - Bleaching powder
  - Flocculation,
  - Sedimentation
  - Filtration
- *Household level de-fluoridation can be done by*:
  - Nalgonda Technique
  - Alumina
  - Phosphates

I Involves addition of:
- Lime[Q]
- Alum (major role)[Q]
- Bleaching powder

Iodine

- *Iodine requirement*[Q]: 150 mcg per day (<1 teaspoon over lifetime)
- *WHO/UNICEF/ICCIDD recommended daily iodine intake*:

Group	Recommended daily intake
Preschool children (0 – 59 months)	90 mcg
School children (6 – 12 years)	120 mcg
Adults (>12 years)	150 mcg
Pregnancy and lactation	250 mcg

I *Iodine requirement*[Q]: 150 mcg per day

Iodised Salt

- Iodisation of salt is the 'most widely used prophylactic measure against prevention of goiter'
- Iodised salt is most convenient, effective and economical method of mass prophylaxis in endemic areas
- *According to Prevention of Food Adulteration (PFA) Act' 1954*:
  - *Level of iodisation in salt (PFA Act' 1954)* [Q]:
    *30 ppm at production level
    *15 ppm at consumer level

I Level of iodisation in salt:
- *30 ppm at production level
- *15 ppm at consumer level

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- *Moisture content*: < 6.0% by weight
- *Sodium chloride*: > 96.0% by weight

Double Fortified/ Twin Fortified Salt (DFS/ TFS)

- *Developed by*: National Institute of Nutrition (Hyderabad)
- *DFS contains Iron and Iodine*:
  - DFS provides 40 mcg Iodine and 1 mg Iron per gram of salt[Q]
  - DFS contains salt, potassium iodate, ferrous sulphate and sodium hexa meta phosphate

District IDD/Goitre Survey

- *Age group*: 6-12 years age group[Q]
- *Sampling:*
  - 30 villages/wards or schools are selected from district by 'Cluster Sampling Technique'[Q]
  - Proportionate to Size Sampling (PPS)
  - Sample of 90 children (45 boys and 45 girls) from school
  - Salt sample collection: From the house of every 5th child selected in earlier steps for goiter survey
  - Sample collection for urinary iodine excretion (UIE): Every alternate child out of those selected earlier for salt samples has to be taken
- *Monitoring*: 50 salt samples per month, 25 UIE samples per month
- *Classification of Goitre:*
  - *Grade 0*: No palpable or visible goiter (No Goitre)
  - *Grade I*: A mass in neck that is consistent with enlarged thyroid, that is 'palpable but not visible' ; moves up in neck as one swallows (Goitre palpable but not visible)
  - *Grade II*: A swelling in neck that is visible when the neck is in a normal position, and is consistent with an enlarged thyroid when neck is palpated (Goitre visible and palpable)

Criteria & Indicators in IDD Control and Elimination

- *IDD Elimination criteria*[Q]:

Indicator	Goal
Proportion with enlarged thyroid (age 6 – 12 years)	< 5 %
Urinary Iodine Excretion below 100 mcg/litre	< 50 %
Urinary Iodine Excretion below 50 mcg/litre	< 20 %
Proportion of houses consuming adequately iodised salt	> 90 %

- *Indicators for epidemiological assessment of iodine deficiency*:
  - Prevalence of goitre
  - Prevalence of cretinism
  - Urinary iodine excretion
  - Measurement of thyroid function (T4, TSH)
  - Prevalence of neonatal hypothyroidism
- *Epidemiological criteria for assessing severity of IDD*:
  - Total Goitre Rate (TGR) - Grade I + Grade II
  - Median Urinary Iodine Excretion
  - Thyroid volume (ultrasound)
  - Salt iodine content
- *Criteria for Sustainable Elimination of IDD*:
  - Median Urinary Iodine Excretion 100 mcg/l
  - Level of iodization[Q]:

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*30 ppm at production level
*15 ppm at consumer level
- Total Goitre Rate (TGR) < 5%

- *Indicators to monitor success of IDD control programme*:
  - *Process Indicators*: Indicators to monitor and evaluate the salt iodization process
    *Salt iodine content at the production site
    *Salt iodine content at point of packaging
    *Salt iodine content at wholesale and retail levels
    *Salt iodine content in households
  - *Impact Indicators*: Indicators to assess baseline (Iodine Deficiency Disorders) IDD status and to monitor and evaluate the impact of salt iodization on the target population
    * *Urinary Iodine Levels*[Q]: The *'principal impact indicator'* recommended once a salt iodization programme has been initiated (changes in goitre prevalence lag behind changes in iodine status and therefore cannot be relied upon to reflect accurately current iodine intake, although they may be useful in following trends)
    * Goitre assessment: (by palpation or by ultrasoun(d) should remain a component of surveys to establish the baseline severity of IDD
    * Neonatal thyroid stimulating hormone (TSH) levels: may also play a role here if a country already has in place a screening programme for hypothyroidism
  - *Sustainability Indicators:* Indicators to assess whether iodine deficiency has been successfully eliminated and to judge whether achievements can be sustained and maintained for the decades to come
    * Median urinary iodine levels in the target population
    * Availability of adequately iodized salt at the household level
    * Set of programmatic indicators (as evidence of sustainability)

Urinary Iodine Levels[Q]*:* 'principal impact indicator'

OTHER NUTRIENTS

Daily intake of about 40 grams of fibre is desirable

Dietary Fibre

- *Description*: Dietary fibre is a non-starch polysaccharide and a physiologically important component of diet; there are two types of dietary fibres:
  - Insoluble fibres: Cellulose, hemi-cellulose and lignin
  - Soluble fibres: Pectins, gums and mucilages
- *Recommended intake*: A daily intake of about 40 grams of fibre is desirable[Q]
  - Indian diets provide about 50-100 grams of fibre per day
  - Cereals and pulses are good sources of fibre (>10 gm fibre per 100 gm)
- *Functions/uses of dietary fibre*[Q]:
  - Forms bulk of stool; reduces tendency of constipation
  - By reducing intestinal transit time of stools, it reduces toxicity
  - Inhibits fecal mutagen synthesis
  - Reduces incidence of colonic polyps and invasive colon cancer
  - Reduces incidence of stomach, breast and prostate cancers
  - Reduces incidence of coronary heart disease
  - Reduces blood levels of glucose and cholesterol
  - Used in the management of irritable bowel syndrome and recurrent diverticulitis

Zinc Deficiency[Q]

- Growth failure
- Sexual infantilism
- Impaired immunity

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- Decreased insulin synthesis
- Delayed wound healing
- Loss of taste (Aguesia)
- Liver disease (Hepatomegaly + Splenomegaly), Pernicious anemia, Thalassemia, Myocardial infarction
- Megaloblastic anemia (due to reduced absorption of Folyl-glutamates)
- *Maternal zinc deficiency*: Spontaneous abortion, Congenital malformation (Anencephaly), Low birth weight, IUGR, Preterm delivery

EGG

Egg

- *An egg (60 grams) contain*[Q]:
  - 6 gm proteins
  - 6 gm fat
  - 30 mg calcium
  - 1.5 mg iron
  - 250 mg cholesterol
  - 70 kcal energy
- Egg protein is best among proteins (NPU = 96), thereby making it *'Reference Protein'*[Q]
- Egg is a poor source of Vitamin C and Carbohydrates[Q]

MILK

Types of Milk

I

Lactose content of milk: Human > Buffalo > Goat > Cow

- *Fat content of milk*: Buffalo > Goat > Cow > Human
- *Protein content of milk*: Buffalo > Goat > Cow > Human
- *Lactose content of milk*: Human > Buffalo > Goat > Cow
- *Energy content of milk*: Buffalo > Goat > Cow > Human

Types of Commercially Available Milk in India

Milk type	Fat content	SNF (Solid-not-fat) content
Full cream	6.0 %	9.0 %
Standardised	4.5 %	8.5 %
Toned	3.0 %	8.5 %
Double toned	1.5 %	9.0 %
Skimmed[Q]	0.5 %	8.7 %

Methods of Pasteurization

Method	Temp	Time	Remarks
Holder/Vat Method[Q]	63-66°C	>30 min	For small and rural communities
HTST Method*[Q]	72°C	>15 sec	Most widely used; for large quantities
HHST Method	68°C	30 min	'Batch Pasteurization'
UHT Method	125°C	Few sec	Heating in 2 stages; 2nd stage under pressure

(*Flash Pasteurization)

Tests of Pasteurized Milk (for adequacy/sufficiency of pasteurization)[Q]

- *Phosphatase Test*: Widely used test[Q]
- *Standard Plate Count*: Enforced limit is 30,000 bacterial count per ml of pasteurized milk
- *Coliform Count*: Standard is coliforms be absent in 1 ml of milk.

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MILK BORNE DISEASES

Infections of animals transmitted to man[Q]	
Primary importance[Q] Tuberculosis Brucellosis Streptococcal infections Staphylococcal poisoning Salmonellosis Q fever	*Lesser importance* Anthrax Cow pox Foot and mouth disease Leptospirosis Tick-borne encephalitis
Infections primary to man	
Diarrhoeal diseases Typhoid and para-typhoid fevers Shigellosis Cholera E. coli	*Non-diarrhoeal diseases* Tuberculosis Diphtheria Streptococcal infections Staphylococcal food poisoning Enteroviral infections Hepatitis viral

OTHER FOOD ITEMS

Foods as Sources of Nutrients

- *Food Items as Poor Sources of nutrients*[Q]:
  - Milk is a poor source of Vitamin C and Iron
  - Meat is a poor source of Calcium
  - Fish is a poor source of Carbohydrates
  - Egg is a poor source of Vitamin C and Carbohydrates
- *Food Items as Rich Sources of nutrients*[Q]:
  - Halibut Liver Oil is richest source of Vitamin A and Vitamin D
  - Indian Gooseberry (amla) is richest source of Vitamin C
  - Gingelly seeds are richest source of Vitamin B1 (Thiamine)
  - Sheep liver is richest source of Vitamin B2 (Riboflavin)
  - Ragi (millet) is a rich source of calcium
  - Pistachio is the richest source of iron

I Halibut Liver Oil is richest source of Vitamin A and Vitamin D

Pulses

Pulse	Energy (Kcal)	Proteins (g)	Fats (g)	Calcium (mg)	Iron (mg)
Bengal Gram	360	17	5	202	5
Black Gram	347	24	1	154	4
Red Gram	335	22	2	73	3
Soya Bean[Q]	432	43	20	240	10

Soyabean

- Soya bean is richest among pulses
  - It contains 43.2% proteins[Q], 20% fats and 4% of minerals
  - Proteins of soya bean are of high nutritive value
- Soya bean is also relatively richer in Calcium, Iron and Vitamin B as compared to other pulses[Q]
- NPU of Soya bean is 55[Q]
- Limiting amino acid in soya bean is Methionine[Q]

I Limiting amino acid in soya bean is Methionine

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Fish

- Richest source of Vitamin A and D is fish liver oils (especially Halibut fish)[Q]
- Rich source of proteins (15-20%)
- Rich source of Calcium, phosphorus, fluorides
- Good source of iron
- Poor source of Carbohydrates[Q]
- Poor source of iodine (barring few sea fish)[Q]

FOOD ADULTERATION

Food Adulteration Diseases

Disease	Toxin[Q]	Adulterant
Lathyrism[Q]	BOAA	Khesari Dal (Lathyrus sativus)
Epidemic Dropsy[Q]	Sanguinarine	Argemone mexicana (oil)
Endemic Ascites[Q]	Pyrrolizidine alkaloids	Crotolaria seeds (Jhunjhunia)
Aflatoxicosis[Q]	Aflatoxin	Aspergillus flavus/parasiticus
Ergotism[Q]	Clavine alkaloids	Claviceps fusiformis

Lathyrism

I Toxin: Present in lathyrus seeds is 'Beta oxalyl amino alanine (BOAA)'

- *Lathyrism is of two types*:
  - *Neurolathyrism*[Q]: In human beings
  - *Osteolathyrism (Odoratism*[Q]*)*: In animals
    - * Neurolathyrism is caused by eating the pulse 'Khesari Dal (Lathyrus sativus)'. Diets containing over 30% of this dal consumed over a period of 2 - 6 months result in neurolathyrism
    - * Lathyrism affects 15 - 45 years of age
- *Toxin*: present in lathyrus seeds is 'Beta oxalyl amino alanine (BOAA)'[Q]
- *It manifests as following stages*:
  - Latent stage
  - No-stick stage
  - One-stick stage
  - Two-stick stage
  - Crawler stage
- *Interventions for prevention and control of Lathyrism*:
  - Vitamin C prophylaxis[Q]
  - Banning the crop
  - *Removal of toxin*: Steeping method and Parboiling[Q]
  - Education
  - Genetic approach
  - Socio-economic changes.

Epidemic Dropsy

I 'Sanguinarine' is the toxin contained in argemone oil

- *Description*: Is caused by contamination of mustard oil with 'Argemone oil'[Q]
- *Toxin*: 'Sanguinarine' is the toxin contained in argemone oil[Q]
- *Mechanism*[Q]: Sanguinarine interferes with oxidation of 'pyruvic acid', which accumulates in blood: It may lead to sudden non-inflammatory edema of bilateral lower limbs, diarrhea, dyspnoea, cardiac failure and death; It can also lead to glaucoma; It may sometimes manifest as 'Sarcoids' (dilatation of skin capillaries)
  - Epidemic dropsy may occur in all ages except breast-fed infants
  - The mortality of epidemic dropsy varies from 5 - 50%
  - Edema in Epidemic dropsy occurs due to proteinuria (specifically loss of albumin).

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- *Argemone oil may be detected by following tests*[Q]:
  - Nitric acid test
  - Paper chromatography test: Most sensitive test

Endemic Ascites

- *Toxin*[Q]: Pyrrolizidine alkaloids (Hepatotoxins)
- *Adulterant*[Q]: Crotolaria plant (Jhunjhunia)

I Toxin[Q]: Pyrrolizidine alkaloids in Endemic Ascites

Ergotism

- *Description*: Occurs due to food toxicant - ergot fungus 'Claviceps fusiformis'[Q]
- *Food items having a tendency for ergotism*[Q]:
  - Bajra[Q]
  - Rye
  - Sorghum
  - Wheat
- *Removal of ergot*:
  - Float them in 20% salt water
  - Hand-picking
  - Air-floatation
- *Upper safe limit for ergot*: 0.05 mg per 100 grams food material

I Food toxicant - ergot fungus 'Claviceps fusiformis'[Q]

MISCELLANEOUS

Food Standards

- *Codex Alimentarius*: Joint FAO/WHO standards for international markets; Food standards in India are based on Codex Alimentarius[Q]
- *PFA standards*: Laid under 'Prevention of Food Adulteration Act 1954'; to obtain a minimum level of quality of food stuffs attainable under Indian conditions
- *Bureau of Indian Standards*: Purely voluntary; express degree of excellence above PFA standards
- *Agmark standards*: Purely voluntary; express degree of excellence above PFA standards.

Mid-day Meal Programme (MDMP) & Scheme (MDMS)

- *Mid-day meal programme (MDMP)*: Also known as 'School Lunch Programme', it has been in operation since 1961
  - *The major objective of MDMP*[Q]: To attract more children for admission to schools and retain them so that literacy improvement of children could be brought about.
  - The meal is a supplement and not a substitute to the home diet[Q]
  - The meal should supply 1/3 of the total energy requirement and 1/2 of the total protein requirement[Q]
  - MDMP is being operationalised under the Ministry of Education[Q]
  - National Institute of Nutrition, Hyderabad is of the view that minimum number of feeding days in year be 250 to have the desired impact on children
- *Mid-day meal scheme (MDMS) (National Programme of Nutritional Support to Primary Education)*: Launched in 1995
  - *Main objective*: Universalisation of primary education by increasing enrolment, retention and attendance and simultaneously impacting on nutrition of students in primary classes
  - The mid-day meal should supply 1/3 of the total energy requirement and 1/2 of the total protein requirement[Q]

I Meal should supply 1/3 of the total energy requirement and 1/2 of the total protein requirement[Q]

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- *A model menu for mid-day school meal*[Q]:

Item	Quantity per child per day	
	Primary	**Upper primary**
Food grains	100 grams	150 grams
Pulses	20 grams	30 grams
Vegetables	50 grams	75 grams
Oils & fats	5 grams	7.5 grams
Salt	As per need	As per need
TOTAL calories	450 Kcal	700 Kcal
TOTAL proteins	12 grams	20 grams

- *Principles for formulating mid-day meals*:[Q]
  - Meal should be a supplement only not a substitute for home diet
  - Meal should provide 1/3 calories and 1/2 proteins
  - Meal cost should be low
  - Complicated cooking process must not be involved
  - Use locally available foods
  - Keep changing menu frequently

Prudent Diet

Refer to Chapter 5, Theory.

Nutritional Status Assessment

I Dietary Cycle[Q] (weighment of raw foods done over a period of 7 days)

- Assessment of dietary intake (Diet Survey): Dietary Cycle[Q] (weighment of raw foods done over a period of 7 days)
- Assessment of nutritional status: **[Mnemonic: CABFAVE]**
  - **C**linical examination
  - **A**nthropometry
  - **L**aboratory and **B**iochemical evaluation
    - Laboratory tests
      1. Hemoglobin
      2. Stools and urine
    - Biochemical tests
  - **F**unctional assessment
  - **A**ssessment of dietary intake
    - Weighment of raw foods (Dietary cycle - 7 days[Q])
    - Weighment of cooked foods
    - Oral questionnaire method
  - **V**ital and health statistics
  - **E**cological studies
    - Food balance sheet
    - Socio-economic factors
    - Health and educational services
    - Conditioning influences

Food Fortification

- *Food fortification*: Is a public health, measure where nutrients are added to food (in relatively small quantities), to maintain/improve the quality of diet of a group, community or a population[Q]
- *Examples of Food Fortification*[Q]:
  - Iodisation of salt
  - Vitamin A and Vitamin D in Vanaspati

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    * Vanaspati is fortified with '2500 IU Vitamin A and 175 IU Vitamin D' per 100 grams
  - Fluoridation of water
- Food Fortification is an example of 'Primary Level of Prevention'
- *Criteria for food fortification*:
  - Vehicle to be fortified must be consumed regularly in diet by populations
  - Amount of nutrient added must not cause deficiency or toxicity in consumers
  - On addition of nutrient, there should be no change in taste, odour, consistency or appearance
  - Cost of fortification must be affordable by consumers

Mid-arm Circumference (MAC)

- MAC is measured for age group 1 - 5 years (as it remains practically constant during this age) Q
- *Shakir's Tape*Q: A useful field instrument for measurement of nourishment status of a child, through measurement of MAC
- *Interpretation of Shakir's tape findings*:

MAC (cms)	Color Zone	Interpretation	Management
> 13.5Q	Green	Satisfactory nutritional status	-
12.5 – 13.5	Yellow	Mild-moderate malnutrition	At home; through diet
< 12.5	Red	Severe malnutrition	Refer; Institutional

I Shakir's TapeQ: A useful field instrument of MAC

Nutritional Surveillance

- *Nutritional surveillance*: Keeping a watch over nutrition, in order to make decisions that will lead to improvement in nutrition of population
- *Main strategy*: Detection of malnutrition (nutritional survey)
- *Approach*: Diagnostic-interventional
- *Sample*: Representative, 50 - 100 size group
- *Objectives*:
  - To aid health and development
  - To provide input for program management and evaluation (to policy makers)
  - To give timely warning and intervention (to prevent short-term food crises).

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MULTIPLE CHOICE QUESTIONS

ENERGY AND PROTEIN REQUIREMENTS

1. **The recommended daily energy intake of an adult pregnant woman with heavy work is:** *[AIPGME 05]*
   (a) 2100 kcal
   (b) 2500 kcal
   (c) 3200 kcal
   (d) 2900 kcal

2. **Extra calories required by lactating mother during first six months over and above daily requirement is:** *[AIIMS Nov 2003, Dec 1997, AIPGME 2000] [Recent Question 2012] [AP 2007, RJ 2009]*
   (a) 550 kcal
   (b) 400 kcal
   (c) 300 kcal
   (d) 250 kcal

3. **The recommended daily energy intake of an adult woman with heavy work is:** *[AIIMS Nov 2000]*
   (a) 1800
   (b) 2100
   (c) 2300
   (d) 2900

4. **Consumption Unit, the coefficient of Dietary Intake, for an adolescent is of value:** *[AIIMS Dec 1994]*
   (a) 0.9
   (b) 1.0
   (c) 1.2
   (d) 1.7

5. **Protein requirement of an adult is:** *[AIPGME 2001]*
   (a) 0.7 gm/kg in terms of Egg protein & 0.7 gm/kg in terms of mixed vegetable protein
   (b) 1.0 gm/kg in terms of Egg protein & 1.0 gm/kg in terms of mixed vegetable protein
   (c) 1.0 gm/kg in terms of Egg protein & 0.7 gm/kg in terms of mixed vegetable protein
   (d) 0.7 gm/kg in terms of Egg protein & 1.0 gm/kg in terms of mixed vegetable protein

6. **In calculating RDA for a particular nutrient, 2 SD are not added for:** *[AIIMS Nov 2006]*
   (a) Iron
   (b) Calcium
   (c) Energy
   (d) Vitamin A

7. **For a 60 kg Indian male, the minimum daily protein requirement has been calculated to be 40 g (mean) ± 10 (Standard deviation). The recommended daily allowance of protein would be:** *[AIPGME 2002]*
   (a) 60 g/day
   (b) 70 g/day
   (c) 40 g/day
   (d) 50 g/day

8. **The recommended daily energy intake of an adult woman with heavy work is:** *[AIPGME 2004]*
   (a) 1800 kcal
   (b) 2100 kcal
   (c) 2300 kcal
   (d) 2900 kcal

9. **For an adult Indian male the daily requirement of protein is expressed as:** *[Karnataka 2004, MH 2002]*
   (a) 0.5 g/kg body weight
   (b) 0.75 g/kg body weight
   (c) 1 gm/kg body weight
   (d) 1.50 g/kg body weight

10. **In 13-15 year female child, recommended daily protein intake (gm/kg/day) is:** *[AIIMS May 2012]*
    (a) 0.68
    (b) 0.95
    (c) 1
    (d) 1.33

11. **Energy requirement in late pregnancy for a moderate worker is:** *[Recent Question 2013]*
    (a) 2500 cal
    (b) 1400 cal
    (c) 1000 cal
    (d) 500 cal

12. **Reference weight of Indian men and women is:** *[AIIMS 2008, 2010, AIPGME 2009, DNB December 2009] [DNB 2000, MH 2002]*
    (a) 60 and 50 kg
    (b) 55 and 50 kg
    (c) 65 and 55 kg
    (d) 45 and 50 kg

13. **False regarding Indian Reference Woman** *[Recent Question 2015]*
    (a) 18-29 years age
    (b) 50 kg weight
    (c) 1.61 meters height
    (d) 21.2 BMI

Review Questions

14. **The daily extra colorie requirement is first trimester of pregnancy is:** *[DNB 2000]*

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(a) 50
(b) 150
(c) 350
(d) 450

15. Which of the following trace element cannot be Completely supplemented by diet during pregnancy: *[UP 2000]*
(a) Fe
(b) Ca++
(c) Zn
(d) Mn

16. Energy requirement of a sedentary female is: *[MP 2004]*
(a) 2200-2400 Kcal
(b) 2400-2800 Kcal
(c) >2800 Kcal
(d) <2000 Kcal

17. According to ICMR the 'Cereals and pulses' requirement for a sedentary strict vegetarian male is? *[MH 2008]*
(a) 200 and 50 grams
(b) 300 and 60 grams
(c) 460 and 40 grams
(d) 560 and 50 grams

18. Calories required for 0-6 m infant is (Kcal/kg): *[RJ 2004]*
(a) 150
(b) 100
(c) 300
(d) 400

PROTEINS

19. Which one of the following is the best indicator of protein quality for recommending the dietary protein requirement? *[AIIMS Nov 2005]*
(a) Protein-efficiency ratio
(b) Biological value
(c) Digestibility coefficient
(d) Net protein utilization

20. The optimum calories to be provided by proteins should be: *[A 1999]*
(a) 5-10%
(b) 10-15%
(c) 15-20%
(d) 20-30%

21. Qualitative assessment of proteins can be done by:
(a) Net Protein Utilization *[AIPGME 1998]*
(b) Protein Energy ratio
(c) Amount of proteins consumed daily
(d) Weight gained on a monthly basis

22. Conditionally Essential amino acids are:
(a) Leucine & Lysine *[AIIMS Nov 2005]*
(b) Histidine & Arginine
(c) Tyrosine & Cysteine
(d) Phenylalanine & Tryptophan

23. The Protein Efficiency Ratio (PER) is defined as: *[AIPGME 1994, AIPGME 2003]*
(a) The gain in weight of young animals per unit weight of protein-consumed
(b) The product of digestibility coefficient and biological value
(c) The percentage of protein absorbed into the blood
(d) The percentage of nitrogen absorbed from the protein absorbed from the diet

24. Highest protein content is in: *[AIIMS May 2005]*
(a) Red gram *[BIHAR 2001, DNB 2008, WB 2002]*
(b) Black gram
(c) Bengal gram
(d) Soya bean

25. Limiting Amino acids in wheat are: *[AIPGME 1997]*
(a) Methionine and lysine *[UP 2004, 2005, 2007]*
(b) Lysine and threonine
(c) Threonine and methionine
(d) Arginine and lysine

26. Pulse protein is deficient in which of the following Essential Amino Acid? *[Karnataka 2009]*
(a) Lysine *[Recent Question 2013]*
(b) Methionine
(c) Threonine
(d) Tryptophan

27. All are true about Net protein utilization (NPU) except: *[AIIMS May 2011]*
(a) Defined as Nitrogen retained by Nitrogen consumed X 100
(b) Good for estimating protein quality
(c) Egg has the highest NPU value
(d) 1 gram protein is equivalent to 1 gram Nitrogen

28. What is known as "poor man's meat"?
(a) Milk *[Recent Question 2012]*
(b) Pulses *[Recent Question 2013]*
(c) Fish
(d) Egg

29. Semi essential amino acids are: *[Recent Question 2012]*
(a) Tryptophan, Tyrosine
(b) Leucine, Lysine
(c) Histidine, Arginine
(d) Phenylalanine, Valine

30. Lysine is deficient in: *[DNB 2007] [DNB December 2011]*
(a) Pulse *[DNB 2001]*
(b) Wheat
(c) Both of the above
(d) None of the above

31. Biological value is maximum of:
(a) Egg *[DNB, 2000, 2003, 2007]*
(b) Milk
(c) Soyabean
(d) Pulses

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32. **Pulses are deficient in:** *[DNB December 2011]*
    (a) Lysine and threonine
    (b) Lysine and tryptophan
    (c) Methionine and cysteine
    (d) Lysine and methionine

33. **Pulse proteins are poor in:** *[DNB June 2009]*
    (a) Methionine
    (b) Lysine
    (c) Threonine
    (d) Alanine

34. **The protein quality indicator adopted by ICMR in recommending dietary protein requirement is:** *[DNB 2007]*
    (a) Amino acid score
    (b) Net protein utilization
    (c) Biological value
    (d) Protein efficiency ratio

35. **Limiting amino acids in Cereals & Pulses respectively:**
    (a) Lysine & Threonine *[Recent Question 2015]*
    (b) Lysine & Cysteine
    (c) Threonine & Methionine
    (d) Lysine & Methionine

36. **Recommended Protein intake (high quality) of an Indian adult man according to 2010 Guidelines is:**
    (a) 0.2 g/kg/d *[Recent Question 2015]*
    (b) 0.83 g/kg/d
    (c) 1.0 g/kg/d
    (d) 1.2 g/kg/d

37. **Protein requirement of a Neonate is** *[CGPG 2015]*
    (a) 1.5 grams
    (b) 2.5 grams
    (c) 3.5 grams
    (d) 4.5 grams

Review Questions

38. **Which of the following has highest protein content:**
    (a) Mutton *[DNB 2000]*
    (b) Soyabean
    (c) Egg
    (d) Milk

39. **Amino acid lesser in rice is:** *[DNB 2001]*
    (a) Lysine
    (b) Methionine
    (c) Both
    (d) None

40. **Net protein utilization is highest in:** *[DNB 2006]*
    (a) Egg
    (b) Wheat
    (c) Milk
    (d) Fish

41. **The protein quality indicator adopted by ICMR in recommending dietary protein requirements is:** *[DNB 2007]*
    (a) Amino acid score
    (b) Net protein utilization
    (c) Biological value
    (d) Protein efficiency ratio

42. **Reference protein is:** *[MH 2000, RJ 2002]*
    (a) Milk
    (b) Meat
    (c) Egg
    (d) Pulses

43. **Maize is deficient in:** *[MH 2000, MH 2002]*
    (a) Methionine
    (b) Lysine
    (c) Lucine
    (d) All

44. **Which method of assessment of quality of proteins gives more complete assessment of protein quality?**
    (a) Biological value *[MH 2007]*
    (b) Net protein utilization
    (c) Digestability co-efficient
    (d) Amunoacid score

45. **Biological value of Rice protein is:** *[MH 2007]*
    (a) 52
    (b) 67
    (c) 80
    (d) 100

FATS AND CARBOHYDRATES

46. **Which of the following is a w-3 Fatty Acid?**
    (a) Linoleic Acid *[AIPGME 1993, 2002]*
    (b) a-Linolenic acid
    (c) Arachidonic acid
    (d) g-Linolenic acid

47. **The highest percentage of polyunsaturated fatty acids is present in:** *[AIIMS May 06; AIPGME 07, 08]*
    (a) Groundnut oil
    (b) Soya bean oil
    (c) Margarine
    (d) Palm oil

48. **Suggested intake of dietary fat per day in pregnancy is:**
    (a) 20 gm *[AIIMS May 1999]*
    (b) 22 gm
    (c) 30 gm
    (d) 45 gm

49. **Most important Essential Fatty Acid is:**
    (a) Linoleic Acid *[AIIMS Nov 2006]*
    (b) Linolenic Acid *[Recent Question 2012]*
    (c) Arachidonic Acid
    (d) Eicosapentanoic Acid

50. **Rank the food items in descending order of their energy yield per 100 grams Carbohydrate – A, Fats – B, Alcohol – C:** *[AIIMS May 2001]*
    (a) A B C *[Recent Question 2012]*
    (b) B C A
    (c) C A B
    (d) C B A

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51. Cereals and proteins are considered complementary since: *[AIPGME 02]*
(a) Cereals are deficient in methionine
(b) Cereals are deficient in methionine and pulses are deficient in lysine
(c) Cereals are deficient in lysine and pulses are deficient in methionine
(d) Both cereals and pulses contain threonine

52. Highest fat content is present in: *[DPG 2008]*
(a) Rice
(b) Wheat
(c) Bajra
(d) Jowar

53. The highest content of saturated fatty acid is in:
(a) Palm oil *[Karnataka 2008]*
(b) Butter
(c) Coconut oil
(d) Margarine

54. Which among the following is a cardio-protective fatty acid? *[AIPGME 2011]*
(a) Palmitic acid
(b) Stearic acid
(c) Omega-3 fatty acids
(d) Oleic acid

55. Amount of cereals provided in Mid-day meal program is: *[Recent Question 2012]*
(a) 50 grams
(b) 75 grams
(c) 100 grams
(d) 150 grams

56. Low glycemic index is for: *[Recent Question 2012]*
(a) Sucrose
(b) Potato
(c) White bread
(d) Fruits

57. Consider the following:
1. Coconut oil
2. Groundnut oil
3. Mustard oil

Which of the above is/are dietary sources of linoleic acid? *[UPSC CMS 2015]*
(a) 1 and 2 only
(b) 1, 2 and 3
(c) 3 only
(d) 2 and 3 only

Review Questions

58. Linoleic acid/EFA's is maximum in: *[DNB 2000, 2004]*
(a) Groundnut oil *[WB 2002, RJ 2004, MP 1998]*
(b) Safflower oil *[AP 2001, UPSC 1990, PGMCET 2015]*
(c) Mustard oil
(d) Coconut oil

59. Richest source of cholesterol is: *[DNB 2004]*
(a) Egg
(b) Hydrogerated oil
(c) Butter
(d) Cheese

60. Maximum amount of essential fatty acids is found in:
(a) Coconut oil *[Kolkata 2005]*
(b) Sunflower oil
(c) Mustard oil
(d) Groundnut oil

61. What % of total calorie should be from Fat & EFA:
(a) 10-30 *[RJ 2009]*
(b) 7-15
(c) 65-80
(d) 1-7

VITAMINS

62. Casal's Necklace is seen in deficiency of:
(a) Vitamin A *[AIIMS Nov 1999]*
(b) Vitamin B3
(c) Vitamin B6
(d) Vitamin D

63. Vitamin A deficiency is considered a public health problem if prevalence rate of night blindness in children between 6 months to 6 years is more than:
(a) 0.01% *[AIIMS May 2006]*
(b) 0.05%
(c) 0.1%
(d) 1.0%

64. Recommended Daily Allowance of free folate in pregnancy is: *[AIIMS Feb 1997]*
(a) 500 mcg
(b) 150 mcg
(c) 300 mcg
(d) 400 mcg

65. Under National Programme for Prevention of Nutritional Blindness, a child in the age group of 6-11 months is given a mega dose of vitamin A equal to:
(a) 50,000 IU *[AIPGME 1992]*
(b) 1 Lakh IU
(c) 1.5 Lakh IU
(d) 2 Lakh IU

66. First clinical sign of Vitamin-A deficiency is:
(a) Night blindness *[AIIMS May 2007]*
(b) Conjunctival xerosis
(c) Bitot's spots
(d) Keratomalacia

67. Under National Immunisation Schedule, total dose of Vitamin-A given to a child is: *[AIPGME 1992]*
(a) 5 lac IU
(b) 6 lac IU
(c) 9 lac IU
(d) 13.5 lac IU

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68. **Vitamin-A solution contains:** *[AIPGME 2006]*
(a) 25,000 IU per ml
(b) 50,000 IU per ml
(c) 1,00,000 IU per ml
(d) 2,00,000 IU per ml

69. **Xerophthalmia is a problem in a community if the prevalence of Bitot's spots is more than:**
(a) 1 % *[AIIMS Jan 1999]*
(b) 0.5 % *[Recent Question 2013]*
(c) 5 % *[Recent Question 2014]*
(d) 25 %

70. **Daily requirement of Vitamin-A by an adult man is:** *[AIIMS Jan 1999]*
(a) 350 mcg
(b) 100 mcg
(c) 600 mcg
(d) 2000 mcg

71. **Minimum amount of sunlight exposure necessary for adequate synthesis of Vitamin-D in the human body is:** *[AIIMS Dec 1994]*
(a) 5 min
(b) 30 min
(c) 2 hrs
(d) 5 hrs

72. **Besides 3 D's (Diarrhoea, Dermatitis & Dementi(a) of Niacin deficiency, 4th D indicates:** *[AIPGME 1995-96]*
(a) Disability
(b) Destruction
(c) Debilitating
(d) Death

73. **'Burning Sole Syndrome' is seen in deficiency of:** *[AIIMS May 1995]*
(a) Riboflavin
(b) Pyridoxine
(c) Pantothenic acid
(d) Vitamin B12

74. **Dose of vitamin A prophylaxis in 6-11 months old child is:** *[DPG 2005]*
(a) 2,00,000 IU
(b) 30,000 IU
(c) 60,000 IU
(d) 1,00,000 IU

75. **Niacin deficiency can result in:** *[DPG 2007]*
(a) Pellagra *[Recent Question 2013]*
(b) Anemia
(c) Peripheral neuropathy
(d) Beri beri

76. **Incidence of Bitot spots to label it as a public health problem is:** *[DPG 2007]*
(a) 0.1%
(b) 0.5%
(c) 1%
(d) 5%

77. **Vitamin A deficiency can cause all of the following *except*:** *[DPG 2007]*
(a) Night blindness
(b) Seborrheic dermatitis
(c) Respiratory infection
(d) Bitot spots

78. **Vit. A deficiency is characterized by:** *[PGI Dec 2008]*
(a) Bitot's spot
(b) Xerophthalmia
(c) Night blindness
(d) Tranta's spot

79. **Daily requirement of Vitamin K** *[Recent Question 2012]*
(a) 3 mg/kg
(b) 0.3 mg/kg
(c) 0.03 mg/kg
(d) 30 mg/kg

80. **Vitamin A deficiency in 18 months old child what is recommended dose:** *[DNB December 2011]*
(a) 200 IU
(b) 2,000 IU
(c) 200,000 IU
(d) 20,000 IU

81. **Vitamin A requirement in infant is:** *[Recent Question 2012] [Recent Question 2013]*
(a) 350 mcg
(b) 600 mcg
(c) 800 mcg
(d) 1000 mcg

82. **Vitamin D is maximum in:** *[Recent Question 2012]*
(a) Milk *[Recent Question 2013]*
(b) Fish fat
(c) Eggs
(d) Cod liver oil

83. **False statement regarding folic acid supplementation?** *[AIIMS November 2013]*
(a) Fortified in all wheat products in India like as in USA
(b) Preconceptionally given for prevention of neural tube defects
(c) It is present in leafy vegetables, spinach, paneer
(d) Requirement per day in pregnancy is 500 mcg

84. **Pellagra in Jowar eating population is due to:**
(a) Niacin in bound form *[NUPGET 2013]*
(b) Deficiency of Tryptophan
(c) Excess of Leucine
(d) High consumption of milk and milk products

85. **Avidin has affinity for:** *[Recent Question 2013]*
(a) Folic acid
(b) Thiamine
(c) Biotin
(d) Riboflavin

86. **Physiologically most active form of Vitamin D is:**
(a) Calciferol *[Recent Question 2014]*
(b) Cholecalciferol
(c) Ergocalciferol
(d) Calcitriol

87. **Bitot's spots are seen in:** *[Bihar 2014]*
(a) Conjunctiva
(b) Cornea
(c) Retina
(d) Vitreous

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88. **In Xeropthalmia, what is X1B:** *[Recent Question 2014]*
(a) Conjunctival xerosis
(b) Bitot's spot
(c) Corneal xerosis
(d) Corneal ulcer

89. **Disease which is characterized by three D's – Diarrhoea, Dermatitis and Dementia is due to deficiency of**
(a) Vitamin A *[PGMCET 2015]*
(b) Niacin
(c) Folate
(d) Vitamin C

90. **No. of doses for treatment of Vitamin A deficiency:**
(a) 1 *[Recent Question 2015]*
(b) 2
(c) 3
(d) 4

91. **Highest amount of Vitamin D is contained in**
(a) Sunlight *[Recent Question 2015]*
(b) Shark liver oil
(c) Cod liver oil
(d) Halibut fish liver oil

92. **Which Vitamin RDA is related to Daily requirement for Proteins?** *[JIPMER 2015]*
(a) B1
(b) B2
(c) B3
(d) B6

Review Questions

93. **Prevalence of Vitamin A deficiency in a community is assessed as:** *[DNB 2000]*
(a) Night blindness-10%
(b) Corneal ulcer-0.01%
(c) Bitot spots-0.5%
(d) Decreased serum retinol level-0.05%

94. **Earliest feature of vitamin A deficiency is:** *[DNB 2004]*
(a) Dryness of conjunctiva *[DNB 2006]*
(b) Nyctalopia
(c) Keratomalacia
(d) Hyphema

95. **Which of the following is supposed to prevent congenital neural tube defect:** *[UP 2000]*
(a) Thiamine
(b) Riboflavin
(c) Pyridoxin
(d) Folic acid

96. **Vitamin E rich Foods are:** *[UP 2002]*
(a) Sunflower oil
(b) Wheat germ oil
(c) Soya bean
(d) All of the above

97. **Daily requirement of vitamin D in children:** *[UP 2002]*
(a) 100 IU
(b) 200 IU
(c) 400 IU
(d) 600 IU

98. **Papilledema is caused by:** *[UP 2006]*
(a) Vitamin A intoxication
(b) Vitamin D intoxication
(c) Vitamin E intoxication
(d) Vitamin B intoxication

99. **Vitamin C content of which of the following is >5 mg per 100 grams?** *[AP 2005]*
(a) Human milk
(b) Dates
(c) Egg
(d) Sitaphal

100. **Vitamin D is least in:** *[AP 2007]*
(a) Milk
(b) Eggs
(c) Fish fat
(d) Shark liver oil

101. **Deficiency of folic acid produces:**
(a) Carcinoma stomach *[TN 1999, TN 2000]*
(b) Spinal degeneration
(c) Changes in central nervous system
(d) Megaloblastic anaemia

102. **The daily requirement of Vitamin D in infants and children is:** *[NIMHANS 1993, TN 2003]*
(a) 2.5 mcg (100 IU)
(b) 5.0 mcg (200 IU)
(c) 10.0 mcg (400 IU)
(d) 20.0 mcg (800 IU)

103. **In measles which vitamin deficiency occurs:**
(a) Vitamin A *[Kolkata 2005]*
(b) Vitamin B
(c) Vitamin C
(d) Vitamin D

104. **Richest source of vitamin B1:** *[Kolkata 2008]*
(a) Rice
(b) Milk
(c) Egg
(d) Groundnut

105. **What is the characteristic feature of vitamin "A" deficiency?** *[MP 2006]*
(a) Bitot's spot
(b) Koplik's spots
(c) Erythema marginatum
(d) Aschoff's nodules

106. **Peripheral neuritis is deficiency sign of:**
(a) Folic acid *[MP 2007]*
(b) Niacin
(c) Thiamine
(d) Tocopherol

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107. **Which of the following is NOT a criteria for determining xerophthalmia problem in the community?** *[MP 2008]*
(a) Bitot's spots 0.05%
(b) Corneal xeroxis 0.01%
(c) Corneal ulcer 0.05%
(d) Serum retinoal level less than 10 mcg/dl 10%

108. **Which of the Following vitamin deficiency diseases occurs in maize eating population?** *[MH 2002]*
(a) Beriberi
(b) Megaloblastic anaemia
(c) Pellagra
(d) Night blindness

109. **Bitot's spots are found in:** *[RJ 2000]*
(a) Measles
(b) Mumps
(c) Vit. A deficiency
(d) Diphtheria

110. **Vit. A requirement in adult male is (Microgram per day):** *[RJ 2003]*
(a) 400
(b) 600
(c) 800
(d) 1000

111. **Highest amount of vit. C is found in:** *[RJ 2004]*
(a) Orange
(b) Lemon
(c) Indian goose berry
(d) Grapes

112. **Decreased level of serum Vit B6 is seen in:** *[RJ 2009]*
(a) CRF
(b) CHF
(c) INH therapy
(d) Alcohol

IRON

113. **Best test to detect iron deficiency in community is:**
(a) Serum transferrin *[AIPGME 2001, 1995]*
(b) Serum ferritin
(c) Serum iron
(d) Hemoglobin

114. **An adult pregnant female is termed anemic if her hemoglobin (venous bloo(d) is:** *[AIIMS Nov 1999]*
(a) Less than 11 g/dl
(b) Less than 12 g/dl
(c) Less than 13 g/dl
(d) Less than 14 g/dl

115. **Which one of the following pulses has the highest content of iron?** *[AIPGME 2006]*
(a) Bengal gram
(b) Black gram
(c) Red gram
(d) Soya bean

116. **Iron absorption from habitual Indian diets is approx:**
(a) < 5 % *[AIPGME 1992]*
(b) 15 –20%
(c) 40 –50%
(d) 70 – 80%

117. **Most sensitive tool for evaluating iron status of the body is:** *[AIPGME 1997- 2001]*
(a) Hb level
(b) Serum iron
(c) Serum transferring saturation
(d) Serum ferritin

118. **Lowest iron content is present in:** *[DPG 2008]*
(a) Milk
(b) Liver
(c) Meat
(d) Fist

119. **Oral iron pills or iron injections must be taken along with:** *[AIPGME 2012]*
(a) High doses of Vitamin A
(b) High doses of Vitamin C
(c) High doses of Essential fatty acids
(d) High doses of Vitamin D

120. **Total Iron requirement in pregnancy:**
(a) 1000 mg *[Recent Question 2013]*
(b) 35 mg
(c) 500 mg
(d) 800 mg

121. **Iron is maximum in:** *[Recent Question 2013]*
(a) Pista
(b) Cashew nut
(c) Meat
(d) Milk

122. **Poor man's iron source is:** *[DNB June 2009]*
(a) Almond
(b) Grapes
(c) Soya
(d) Jaggery

Review Question

123. **Daily dose of Fe for adult man:** *[DNB 2001]*
[Recent Question 2012]
(a) 18 mg/d
(b) 24 mg/d
(c) 34 mg/d
(d) 40 mg/d

IODINE AND FLUORINE

124. **Fluoride content in drinking H_2O normally safe is:**
(a) 0.5-0.8 mg/l *[Recent Question 2015, AIPGME 1994]*
(b) 0.8-1.0 mg/l *[TN 2003, MH 2008, RJ 2002]*
(c) 0.2-0.8 mg/l
(d) 0.2-0.5 mg/l

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125. Dental fluorosis is best seen in: *[AIIMS Nov 2007]*
(a) Central & Lateral Incisors
(b) Central Incisors & 1st Molars
(c) 1st & 2nd Molars
(d) Canines

126. 'Twin fortified salt' contains: *[AIIMS Dec 1995]*
(a) Iodine + Fluorine
(b) Iodine + Calcium
(c) Iodine + Iron
(d) Iodine + Chlorine

127. 1 gram of 'Twin fortified salt' provides:
(a) 1 mcg Iodine + 40 mg Iron *[AIIMS Dec 1997]*
(b) 40 mcg Iodine + 40 mg Iron
(c) 1 mcg Iodine + 1 mg Iron
(d) 40 mcg Iodine + 1 mg Iron

128. PFA Act'1954 has laid down standard for level of Iodisation of salt: *[AIIMS June 1997]*
(a) 90 ppm at Production level & 60 ppm at Consumer level
(b) 60 ppm at Production level & 15 ppm at Consumer level
(c) 30 ppm at Production level & 60 ppm at Consumer level
(d) 30 ppm at Production level & 15 ppm at Consumer level

129. Iodised oil (usual dose of 1 ml i/m) gives protection for: *[AIPGME 2005]*
(a) 3-4 weeks
(b) 3-4 months
(c) 3-4 years
(d) 10-12 years

130. Daily requirement of Iodine in adults is:
(a) 50 mcg *[AIIMS Sep 1996, RJ 2001, 2008]*
(b) 100 mcg *[Recent Question 2013, TN 1997, 2003]*
(c) 150 mcg
(d) 200 mcg

131. As per the World Health Organization guidelines, iodine deficiency disorders are endemic in a community if the prevalence of goiter in school age children is more than: *[AIIMS Nov 02]*
(a) 1% (b) 5%
(c) 10% (d) 15%

132. Acceptable fluoride concentration in drinking water is:
(a) 1 ppm *[DPG 2007]*
(b) 2 ppm
(c) 3 ppm
(d) 4 ppm

133. Under the Prevention of Food Adulteration (PFA) Act, the expected level of iodine in iodized salt at production level is NOT less than: *[Karnataka 2011]*
(a) 30 ppm
(b) 25 ppm
(c) 20 ppm
(d) 15 ppm

134. Recommended Iodine dose in pregnancy is:
(a) 15 mcg *[AIIMS November 2013]*
(b) 100 mcg
(c) 150 mcg
(d) 250 mcg

135. Endemic cretinism is seen when iodine uptake is less than: *[DNB December 2011]*
(a) 5 micro gram/day
(b) 20 micro gram/day
(c) 50 micro gram /day
(d) 75 micro gram/day

136. Iodine comes in iodine salt. Requirement in humans at consumer level: *[Recent Question 2013]*
(a) 5 PPM
(b) 15 PPM
(c) 25 PPM
(d) 35 PPM

137. Prevalence of iodine deficiency in India:
(a) 1:100 *[Recent Question 2012]*
(b) 1:10
(c) 3:100
(d) 3:10

138. False regarding Fluorosis symptoms *[Recent Question 2015]*
(a) Mottling of dental enamel > 1.5 mg/L
(b) Skeletal fluorosis 3.0-6.0 mg/L
(c) Crippling fluorosis >10 mg/L
(d) None of the above

139. Fluorine levels intake required for development of Skeletal fluorosis *[Recent Question 2015]*
(a) 1.0-1.5 ppm
(b) 1.5-3.0 ppm
(c) 3.0-6.0 ppm
(d) >10 ppm

140. Fluorine levels intake required for development of Crippling fluorosis *[Recent Question 2015]*
(a) 1.0-1.5 ppm
(b) 1.5-3.0 ppm
(c) 3.0-6.0 ppm
(d) >10 ppm

Review Questions

141. Maximum Permitted level of fluoride in drinking water is — —meq/L: *[DNB 2000]*
(a) 0.5
(b) 0.8
(c) 1.0
(d) 1.5

142. The Iodine content in iodized salt at production point should be: *[DNB 2001]*
(a) 10 ppm
(b) 20 ppm
(c) 30 ppm
(d) 40 ppm

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143. In Iron deficiency anemia, after haemoglobin level has returned to normal so that iron stores are replenished. The Iron tablets should be recommended for: *[UP 2008]*
(a) 0 – 3 months
(b) 3 – 6 months
(c) 6 – 12 months
(d) 12 – 24 months

144. Poor source of Iron is in: *[AP 2002]*
(a) Butter
(b) Green leafy vegetable
(c) Jaggery
(d) Meat

145. In pregnancy content of Iron in IFA tablet is: *[RJ 2001]*
(a) 100 mg
(b) 200 mg
(c) 500 mg
(d) 800 mg

OTHER NUTRIENTS

146. How much amount of energy is yielded by one ml of alcohol in the body? *[AIIMS Dec 1995]*
(a) 1 cal
(b) 4 cal
(c) 7 cal
(d) 9 cal

147. Daily requirement for Dietary Fibre by an adult is approx: *[AIIMS Nov 2005]*
(a) 1 gm
(b) 4 gm
(c) 40 gm
(d) 100 gm

148. Which of the following is the non-essential micro-nutrient? *[AIIMS Nov 2010]*
(a) Iron
(b) Manganese
(c) Lead
(d) Sodium

149. One of the following is not reported to be a clinical manifestation of Zinc deficiency in children:
(a) Dwarfism and hypogonadism
(b) Liver and spleen enlargement
(c) Impaired cell-mediated immunity
(d) Macrocytic anaemia *[Recent Question 2013]*

150. Zinc supplement given in 12 month baby: *[Recent Question 2013]*
(a) 20 mg/day
(b) 10 mg/day
(c) 5 mg/day
(d) 15 mg/day

151. Adult non-pregnant female requires, calcium per day: *[Recent Question 2013]*
(a) 400 mg
(b) 600 mg
(c) 800 mg
(d) 1000 mg

152. Daily calcium requirement of infants is: *[Recent Question 2012]*
(a) 300 mg
(b) 500 mg
(c) 600 mg
(d) 1200 mg

153. Keshan cardiomegaly occur due to deficiency of: *[Recent Question 2013]*
(a) Selenium
(b) Copper
(c) Zinc
(d) Iron

154. RDA of calcium in normal adult male is: *[DNB June 2011]*
(a) 800 mg
(b) 400 mg
(c) 1200 mg
(d) 100 mg

155. Daily elemental calcium requirement for an elderly woman is: *[AP 2014]*
(a) 1200 mg
(b) 300 mg
(c) 2000 mg
(d) 2500 mg

156. Acrodermatitis enteropathica is: *[Recent Question 2014]*
(a) Inherited disorder of excessive excretion of zinc from body
(b) Inherited disorder of impaired uptake of zinc from body
(c) Inherited disorder of excessive excretion of copper from body
(d) Inherited disorder of impaired uptake of copper from body

157. Trace element is what percent of body weight: *[Recent Question 2014]*
(a) 0.001%
(b) 0.01%
(c) 0.1%
(d) 1%

158. Zinc deficiency leads to all except: *[PGMCET 2015]*
(a) Delayed Sexual Maturation
(b) Impaired Immune function
(c) Skeletal Abnormalities
(d) Excessive Appetite

Review Questions

159. Which of the following trace element has vitamin E like action: *[DNB 2002]*
(a) Selenium
(b) Cheomicin
(c) Copper
(d) Zinc

160. Under the prevention of Food Adulteration Act (PFA) the level of iodine salt at consumer level is: *[UP 2008]*

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(a) 0 -5 ppm
(b) 5 -10 ppm
(c) 5 -15 ppm
(d) 5 -30 ppm

161. Spectrum of IDD cretin does not include: *[AP 2005]*
(a) Still births
(b) Hyperactivity
(c) Deafness
(d) Delayed development

162. The level of fluorine in drinking water highly associated with dental fluorosis is: *[MP 2008]*
(a) 0.5 mg/L
(b) 1.0 mg/L
(c) 1.5 mg/L
(d) 2.0 mg/L

163. In drinking water fluoride levels should be less than _____mg/L: *[MH 2007]*
(a) 1.5
(b) 1
(c) 05.
(d) 0.1

164. Defloridation of water is done by which technique:
(a) Nalgonda *[RJ 2003, 2004, MP 2003]*
(b) Nagpur
(c) Patna
(d) Kasauli

165. Micronutrient associated with rash and diarrhea:
(a) Manganese *[Kolkata 2005]*
(b) Copper
(c) Zinc
(d) Iron

166. Highest calcium concentration is present in:
(a) Dates *[Kolkata 2007]*
(b) Guava
(c) Amla
(d) Mango

167. Zinc deficiency is characterized by: *[RJ 2009]*
(a) Sexual infantilism
(b) Poor growth
(c) Poor wound healing
(d) All of the above

168. Copper deficiency is characterized by: *[RJ 2009]*
(a) Myelopathy
(b) Neutropenia
(c) Anemia
(d) All of the above

169. Egg are "reference protein" because: *[UP 2004]*
(a) High caloric content
(b) Increased protein/100 gm
(c) Increased biological value and +NPU
(d) Decreased digestibility coefficient

EGG

170. Egg is poor in: *[AIIMS Dec 1998]*
(a) Proteins
(b) Carbohydrate & Vitamin C
(c) Calcium & Iron
(d) Fats

171. NPU value for Egg is: *[AIIMS Sep 1996]*
(a) 140
(b) 96
(c) 81
(d) 52

172. Egg has all vitamins *except*: *[Recent Question 2012]*
(a) B1
(b) B6
(c) C
(d) E

Review Questions

173. Egg is deficient in which of the following:
(a) Fat *[Bihar 2004]*
(b) Protein
(c) Carbohydrate
(d) Vitamin

174. Egg is ideal protein because it has: *[AP 2002]*
(a) High digestibility
(b) It has best quality of protein
(c) High proteins
(d) High protein and fats

175. Egg lacks the following: *[AP 2005]*
(a) Protein
(b) Cholesterol
(c) Carbohydrate
(d) Vitamins

176. In Egg, Egg white contributes: *[RJ 2003]*
(a) 50%
(b) 58%
(c) 30%
(d) 70%

177. One egg yield about kcal of energy:
(a) 50 *[RJ 2004]*
(b) 60
(c) 70
(d) 80

178. What is not found in egg? *[RJ 2006]*
(a) Cholesterol
(b) Vit. C
(c) Calcium
(d) Fat

179. Egg has all vitamin *except*: *[RJ 2006]*
(a) B1
(b) B6
(c) C
(d) E

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MILK

180. Pasteurization by Holder method is heating milk at: *[AIPGME 2000]*
(a) 60° C for 45 minutes
(b) 65° C for 30 minutes
(c) 100° C for 15 minutes
(d) 136° C for 15 minutes

181. Which one of the following is NOT used in testing for adequate pasteurization of milk?
(a) Phosphatase test *[AIPGME 2005, AIIMS Nov 2008]*
(b) Coliform count *[Recent Question 2013, 2014]*
(c) Standaed plate count
(d) Methylene blue reduction test

182. Milk is a good source of all vitamins *except*: *[AIIMS Jan 1998]*
(a) Vitamin A
(b) Vitamin B
(c) Vitamin C
(d) Vitamin D

183. Level of proteins in human milk (per 100 ml) is: *[AIIMS Dec 1995]*
(a) 0.5 gm
(b) 2.6 gm
(c) 1.1 gm
(d) 4.7 gm

184. Milk is rich in all except: *[PGI Dec 01]*
(a) Vitamin A
(b) Vitamin D
(c) Iron
(d) Vitamin E
(e) Vitamin C

185. True about cow's milk are all except:
(a) Cow's milk contains 80% whey protein and not casein *[AIIMS May 2010]*
(b) Has more protein than breast milk
(c) Has more K+ and Na+ than breast milk
(d) Has less carbohydrates than mothers milk

186. Pasteurised milk is most commonly tested by:
(a) Phosphatase test *[AIPGME 2011]*
(b) Coliform test *[Recent Question 2015]*
(c) Catalase test
(d) Oxidase test

187. Arrange the following milk/milk products in term of increasing content of Fat (per 100 grams or 100 ml)
(a) Human milk, Buffalo milk, Curd (Cow's milk), Cheese *[Recent Question 2015]*
(b) Cheese, Human milk, Curd (Cow's milk), Buffalo milk
(c) Human milk, Curd (Cow's milk), Buffalo milk, Cheese
(d) Curd (Cow's milk), Human milk, Cheese, Buffalo milk

188. Consider the following milk borne diseases,
1. Brucellosis
2. Listeriosis
3. Salmonellosis

Which of the above can be controlled by Pasteurization? *[UPSC CMS 2015]*
(a) 1 only
(b) 2 and 3 only
(c) 3 only
(d) 1, 2 and 3

189. Milk borne diseases are:
(a) Brucellosis *[PGI May 2011]*
(b) Tuberculosis
(c) Chickenpox
(d) Q-fever
(e) Leptospirosis

190. Human's breast milk is essential for the newborn as it contains: *[AIIMS November 2011]*
(a) Linoleic acid
(b) Linolenic acid
(c) Docosahexanoic acid
(d) Arachidonic acid

191. Colostrum has in compared to normal milk:
(a) Decreased Vitamin A *[Recent Question 2012]*
(b) Decreased Na+
(c) Increased proteins
(d) Increased calories

192. What is absent in breast milk? *[DNB December 2011]*
(a) Vitamin K *[Recent Question 2013]*
(b) Vitamin C
(c) Vitamin D
(d) Vitamin A

193. Phosphatase test in milk is done to know *[DNB 2007]*
(a) Quality of pasteurization
(b) Contamination of milk
(c) Nutritive value
(d) Coliform count

194. According to WHO, exclusive breast milk is given upto:
(a) 6 months *[Recent Question 2013]*
(b) 4 months
(c) 8 months
(d) 10 months

195. Pasteurization of milk is achieved by boiling at:
(a) 65°C for 30 min *[Recent Question 2013]*
(b) 72° for 10 sec
(c) 100° for 20 sec
(d) 136° for 30 sec

Review Questions

196. A child is exclusively fed on cow's milk, the deficiency seen in: *[DNB 2002]*
(a) Iron
(b) Riboflavin
(c) Vitamin A
(d) Thiamine

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197. Phosphatase test in Milk is done to know: *[DNB 2007]*
(a) Quality of Pasteurization
(b) Contamination of Milk
(c) Nutritive value
(d) Coliform count

198. All are true about human milk *except*: *[Kerala 2001) (UP 2004]*
(a) Low lactose
(b) Contains more Vitamin-D
(c) Higher percentage of linoleic acid and oleic acid
(d) Better iron bioavailability

199. Milk transmits all *except*: *[Kolkata 2008]*
(a) Q fever
(b) Typhoid fever
(c) Brucellosis
(d) Endemic typhus

200. Which of the following contains least amount of protein in 100 gm of milk: *[MP 2001]*
(a) Human milk
(b) Cow milk
(c) Buffalo milk
(d) Goat milk

201. Milk is deficient in the following: *[MP 2007]*
(a) Tryptophan containing amino acids
(b) Linoleic acid
(c) Ascorbic acid
(d) Calceferol

202. Percentage of lactose in human milk is: *[RJ 2001]*
(a) 2.5 gm
(b) 5 gm
(c) 7.2 gm
(d) 10 gm

203. Compared with cow's milk, mother's milk has more:
(a) Lactose *[RJ 2008]*
(b) Vitamin D
(c) Protein
(d) Fat

OTHER FOOD ITEMS

204. Match List I correctly with List D and select your answer using the codes given below:

	List I		List D
a.	Papaya fruit	I.	Calcium
b.	Soya beans	II.	Vitamin C
c.	Ragi	III.	Protein
d.	Amla fruit	IV.	Vitamin A

(a) a-I, b-III, c-II, d-IV *[AIPGME 1993]*
(b) a-IV, b-I, c-III, d-II
(c) a-IV, b-III, c-I, d-II
(d) a-I, b-III, c-IV, d-II

205. Rice is poor in all *except*: *[AIIMS Sep 1996]*
(a) Calcium
(b) Iron
(c) Vitamins A, D, C
(d) Lysine

206. Soyabean contains protein to the tune of:
(a) 20% *[AIIMS Dec 1995]*
(b) 40%
(c) 60%
(d) 80%

207. Fish is the source of all *except*? *[AIIMS May 2011]*
(a) Iron
(b) Iodine
(c) Vitamin A
(d) Phosphorus

208. Nutritional value(s) of dates (per 100 grams) include:
(a) Iron 10 mg *[PGI May 2012]*
(b) Calcium 39 mg
(c) Beta carotene 6 micrograms
(d) Calories 280 Kcal
(e) Vitamin C 100 mg

209. Tomatoes are rich in: *[DNB 2008]*
(a) Oxalic acid
(b) Citric acid
(c) Acetic acid
(d) Formic acid

210. Banana is good source of: *[PGI November 2014]*
(a) Calcium
(b) Phosphorus
(c) Vitamin B6
(d) Vitamin C
(e) Potassium

211. Fermentation of Pulses increase following except
(a) Thiamine *[Recent Question 2015]*
(b) Riboflavin
(c) Niacin
(d) Ascorbic acid

Review Questions

212. Which of the following has highest protein content:
(a) Mutton *[DNB 2005]*
(b) Soyabean
(c) Egg
(d) Milk

213. One of the following contains maximum calcium:
(a) Rice *[AP 2000]*
(b) Wheat
(c) Ragi
(d) Jowar

214. Paraboiling of rice reduces: *[AP 2002]*
(a) Beriberi
(b) Pellagra
(c) Dermatitis
(d) All of the above

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215. Dates are rich source of: *[AP 2004]*
(a) Calcium
(b) Iron
(c) Vitamin C
(d) Carotene

216. Highest calorie content is found in: *[MP 2002]*
(a) Banana
(b) Apple
(c) Guava
(d) Orange

217. The food item rich in calcium is: *[MP 2008]*
(a) Rice
(b) Wheat
(c) Jowar
(d) Ragi

218. An amino acid found in excess in some strains of maize is: *[MP 2008]*
(a) Leucine
(b) Valine
(c) Lysine
(d) Tryptophan

219. Lysine is deficient in: *[MH 2000]*
(a) Cereals
(b) Pulses
(c) Jowar
(d) Soyabean

220. Sorghum is pellagrogenic due to excess content of:
(a) Lysine *[MH 2006]*
(b) Threonine
(c) Leucine
(d) Tryptophan

221. Maize is pellagrogenic due to excess of: *[MH 2007]*
(a) Lysine
(b) Leucine
(c) Tryptophan
(d) Methionine

222. Maximum calories per 100 gm are in: *[RJ 2000]*
(a) Jaggery
(b) Pulsles
(c) Green vegetables
(d) Egg

223. Pulses are deficient in: *[RJ 2003]*
(a) Lysine
(b) Leucine
(c) Methionine
(d) All

FOOD ADULTERATION

224. Endemic ascites is caused by: *[AIIMS Nov 06, May 08]*
(a) Aflatoxin
(b) Sanguinarine
(c) Pyrrolizidine
(d) Ergot alkaloid

225. Epidemic dropsy is caused by: *[AIIMS Feb 1997, June 1998, Nov 2007, Karnataka 1999]*
(a) Sanguinarine
(b) BOAA *[Recent Question 2012, Bihar 1999]*
(c) Pyruvic Acid *[DNB 2011, UP 1998, 1999, DPG 2005]*
(d) Mustard oil *[RJ 2000, 04, AP 02, MH 1995, 97, 02]*

226. BOAA is the toxin responsible for:
(a) Epidemic Dropsy *[AIPGME 92, AIIMS June 1997]*
(b) Neurolathyrism
(c) Endemic Ascitis
(d) Fluorosis

227. BOAA, the toxin responsible for Neurolathyrism, contains which amino acid: *[AIPGME 1992,1996]*
(a) Aspartate
(b) Arginine
(c) Alanine
(d) Butyrate

228. Ingestion of which of the following can result in ergotism? *[DPG 2007]*
(a) Bajra
(b) Maize
(c) Kesari dal
(d) Mustard

229. Lathyrism is due to consumption of: *[Karnataka 2004]*
(a) Red gram dhal
(b) Contaminated ground nuts
(c) Bengal gram dhal
(d) Khesari dhal

230. Which of the following statement (s) is/are true about Lathyrism: *[PGI May 2011]*
(a) Vitamin C prophylaxis
(b) Banning of crop
(c) Flaccid paralysis
(d) Parboiling detoxicate pulses
(e) BOAA is causative toxin

231. Manifestation(s) of Epidemic dropsy is/ are:
(a) Glaucoma *[PGI May 2011]*
(b) CHF
(c) GI bleed
(d) Gut telangiectasia
(e) Dyspnoea

232. Ergotism is due to toxic alkaloids produced by fungus: *[DNB December 2011] [NUPGET 2013]*
(a) Trichophyton
(b) Claviceps purpurea
(c) Fusarium species
(d) Absidia

233. Endemic ascites is caused by: *[PGI May 2012]*
(a) Argemone Mexicana seed
(b) Khesari dal
(c) Jhunjhunia seeds
(d) Ergot poisoning
(e) Aspergillus flavus

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234. Argemone oil contamination of mustard oil can be detected by: *[Recent Question 2012]*
(a) Phosphatase test
(b) Nitric acid test
(c) Coliform test
(d) Methylene blue test

235. Most sensitive test for sanguinarine is:
(a) FeC13 *[Recent Question 2013]*
(b) Paper chromatography
(c) HCl
(d) Nitric Acid

Review Questions

236. Lathyrism results due to: *[DNB 2000, 2005]*
(a) Aflatoxin *[Recent Question 2013]*
(b) BOAA *[MH 2003] [RJ 2000]*
(c) Pyruvic acid
(d) Sanguinarine

237. Neuro lathyrism results due to: *[DNB 2006]*
(a) Aflatoxin
(b) BOAA
(c) Pyruvic acid
(d) Sanguinarine

238. Cause of endemic ascites is: *[UP 2001] [MP 2008]*
(a) Pyrolizidine
(b) Beta-oxaloacetate
(c) Sanguinarine
(d) Aflatoxin

239. Toxin present in lathyrus sativa: *[MP 2000]*
(a) Pyrazolone alkaloids
(b) Sanguinarine
(c) BOAA
(d) Aflatoxin

240. Lathyrism from Khesari dal can be prevented by which process: *[MP 2003]*
(a) Parboiling
(b) Heating
(c) Soaking
(d) Filtration

241. Test to detect contamination of mustard oil with argemone oil? *[MH 2008]*
(a) Nitric acid test
(b) Sulphuric acid test
(c) Chromic acid test
(d) All of the above

MISCELLANEOUS

242. Which of the following statements about Recommended Dietary Allowance is false? *[AIIMS Nov 2007; AIPGME 2008]*
(a) RDA is decided by a panel of experts and is based on scientific research
(b) RDA caters to dietary requirements of all people
(c) RDA is often higher than the recommended minimum requirement
(d) RDA is based on Estimated Average Requirement

243. A man weighing 68 kg, consumes 325 gm carbohydrate, 65 gm protein and 35 gms fat in his diet. The most applicable statement here is:
(a) His total calorie intake is 3000 kcal
(b) The proportion of proteins, fats and carbohydrates is correct and in accordance with a balanced diet
(c) He has a negative nitrogen balance *(AIPGME 01)*
(d) 30% of his total energy intake is derived from fat

244. Food standards in India have to achieve a minimum level of quality under: *[AIIMS Jan 1999]*
(a) Codex Alimentarius
(b) Bureau of Indian Standards
(c) Agmark standards
(d) PFA standards

245. Weight of an Indian reference woman is:
(a) 45 Kg *[AIIMS Nov 04,08]*
(b) 50 Kg
(c) 55 Kg
(d) 60 Kg

246. True about midday meal programme:
(a) Provides 1/2 the total energy requirement & 1/3 the total protein requirement in a child
(b) A substitute for home diet *[AIPGME 1997]*
(c) Main objective of this scheme is to eliminate malnutrition
(d) None of the above

247. Mid day meal contains proteins and calories in what proportions: *[AIPGME 1997]*
(a) 1/2 proteins and 1/2 calories *[DNB 2000, 2007]*
(b) 1/2 proteins and 1/3rd calories
(c) 1/3rd proteins and 1/3rd calories
(d) 2/3rd calories and 1/3rd proteins

248. Dietary changes advocated by WHO for prevention of heart diseases include all of the following *except*: *[AIIMS Dec 1995]*
(a) A decrease in complex carbohydrate consumption.
(b) Reduction in fat intake to 20-30 per cent of caloric intake.
(c) Consumption of saturated fats be limited to less than 10% of total energy intake.
(d) Reduction of cholesterol to below 100mg per 1000 kcal per day.

249. 'One Dietary Cycle' comprises of:
(a) 24 hrs *[AIIMS Dec 1992]*
(b) 48 hrs
(c) 7 days
(d) 1 month

250. All are examples of Food Fortification *except*:
(a) Iodisation of salt *[AIIMS May 1991]*
(b) Vitamin A in Vanaspati

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(c) Fluoridation of water
(d) Saffron colour in milk

251. Nalgonda Technique is used for: *[AIPGME 1999]*
(a) Chlorination of water
(b) Defluoridation of water
(c) Iodisation of salt
(d) Detoxification of contaminated mustard oil

252. Shakir's tape is a useful method employed in the field to measure: *[AIIMS May 1994]*
(a) Head Circumference
(b) Mid arm Circumference
(c) Height/Length
(d) Chest circumference

253. Salter's Scale is a useful method employed in the field to measure: *[AIIMS May 1994]*
(a) Mid arm Circumference
(b) Length at birth
(c) Skin fold thickness
(d) Birth weight

254. What will be the BMI of a male whose weight is 89 kg and height is 172 cm? *[AIIMS Nov 1993]*
(a) 27
(b) 30
(c) 33
(d) 36

255. Which of the following poisonings can result in spastic paraplegia? *[DPG 2005]*
(a) Lathyrus
(b) Strychnine
(c) Sanguinarine
(d) Organophosphates

256. Pellagra: *[Karnataka 2008]*
(a) Is due to pyridoxine deficiency
(b) Occurs with diet chiefly on maize
(c) Night blindness is a presenting feature
(d) Causes high output cardiac failure

257. Why cereals and pulses are combined: *[DPG 2006]*
(a) 10% cereals contain protein and pulses contain 40%
(b) Cereals are deficient in methionine and lysine is deficient in pulses
(c) Cereals are deficient in lysine and methionine is deficient in pulses
(d) Cereals are rich in essential AA

258. What is /are components of Nutrition surveillance?
(a) Policy maker *[PGI Nov 2010]*
(b) AFP surveillance
(c) Nutritional survey
(d) DOTS

259. Regular drinking of which of the following can help prevent Urinary tract infection (UTI)?
(a) Grape juice *[AIIMS November 2011]*
(b) Orange juice
(c) Cranberry juice
(d) Raspberry juice

260. Which of the following are true regarding principles suggested for Mid-day meal programme?
(a) Meal should be a supplement only not a substitute for home diet *[PGI November 2011]*
(b) Meal should provide 1/2 calories and 1/3 proteins
(c) Meal cost should be low
(d) Complicated cooking process must not be involved
(e) Keep same menu of meals for longer periods

261. Common to both acute and chronic malnutrition is:
(a) Weight for age *[AIIMS May 2012]*
(b) Weight for height
(c) Height for age
(d) BMI

262. Food with maximum cholesterol content:
(a) Egg *[AIIMS May 2012]*
(b) Coconut oil
(c) Hydrogenated fats
(d) Ghee (hydrogenated)

263. True about Indian reference male is: *[AIIMS May 2012]*
(a) Age 18-29 yrs *[Recent Question 2012]*
(b) Weight 65 kg
(c) Work is mainly sedentary
(d) Works for 10 hrs

264. International food standards include: *[JIPMER 2014]*
(a) BIS standards
(b) Codex alimentarius standards
(c) AgMark standards
(d) PFA standards

265. Acute severe malnutrition diagnostic criteria include all *except*: *[AIIMS May 2014]*
(a) Bipedal edema
(b) Visible severe wasting
(c) Mid arm circumference below 115 mm
(d) Weight for height below 2SD of WHO Growth Standards 2006

266. Food standards in India are based on the Standards of the *[PGMCET 2015]*
(a) Codex alimentarius
(b) PFA standards
(c) The AGMARK standards
(d) Bureau of Indian standards

267. Consider the following statements,
1. In food preservation by irradiation, ionising rays are used.
2. Irradiation does not affect the colour, odour, taste, pH and levels of vitamin contents in foods.

Which of the statements given above is/are correct?
(a) 1 only *[UPSC CMS 2015]*
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

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268. Consider the following,

1. Lactic acid
2. Sorbic acid
3. Sulphurous acid

Which of the above are food preservatives?

(a) 1 and 2 only *[UPSC CMS 2015]*
(b) 2 and 3 only
(c) None of these
(d) 1, 2 and 3

Review Questions

269. About protein energy malnutrition, following are true except: *[DNB 2001]*
(a) Optimal protein supplementation is 1.5-2g/kg/day
(b) Hepatomegaly is an essential feature
(c) Hypothermia may be a cause of death
(d) Common in developing countries

270. The best parameter for assessment of chronic malnutrition is: *[DNB 2002]*
(a) Weight for age
(b) Weight for height
(c) Height for age
(d) Any of the above

271. In assessing the nutritional status of community the following are used *except*: *[UP 2002]*
(a) Mortality in 1-4 years age group
(b) Low birth weight
(c) Weight/height index in preschool children
(d) Percentage of pregnant lady with less than 11.5% Hb

272. Vitamin A prophylaxis includes all *except*:
(a) For infant 1,00,000 I.U. at 6 month interval
(b) For more than 1 years 2,00,000 I.U at 6 month interval
(c) For postpartum 3,00,000 I.U *[UP 2002]*
(d) 50,000 I.U at birth

273. Dental caries is due to deficiency of: *[AP 2002]*
(a) Fluorine
(b) Zinc
(c) Lead
(d) Calcium

274. Nutritional status of community is measured by all *except*: *[AP 2007]*
(a) Mid-arm circumference in 0-1 year age group
(b) Anemia detection in pregnancy
(c) Child birth weight <2500 gm
(d) Height and weight calculated in < 5 years age group

275. Methylene blue test is used to detect: *[Kolkata 2007]*
(a) Microorganisms
(b) Lactose
(c) Protein
(d) Sugar

276. Calcium content is highest in: *[MP 2001]*
(a) Jowar
(b) Bajra
(c) Ragi
(d) Cereals

277. Prudent diet is: *[MH 2005]*
(a) Diet for dietary goal achievement
(b) Diet, which contains variety of foods to safe guard from deficiencies
(c) Diet on which a person or group lives
(d) Diet, which fulfills recommended daily allowances

278. Standardization of food by the directorate of marketing and inspection of government of India is known as: *[JIPMER 2005; MH 2006]*
(a) PFA standards
(b) Codex Alimentarius
(c) AGMARK standard
(d) Bureau of India standards

279. A patient has microcytic Anemia, least likely diagnosis is: *[RJ 2003]*
(a) Iron deficiency
(b) Thalassemia
(c) Sideroblastic anemia
(d) B12 deficiency

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EXPLANATIONS

ENERGY AND PROTEIN REQUIREMENTS

1. **Ans. (c) 3200 kcal** *[Ref. Park 23/e p634]*
   - *Recommended daily energy and protein intake:* *(New Guidelines 2011)*

Group	Particulars	Energy (Kcal/(d)	Proteins (g/(d)
Adult Male	Sedentary worker	2320	60
	Moderate Worker	2730	60
	Heavy Worker	3490	60
Adult Female	Sedentary worker	1900	55
	Moderate Worker	2230	55
	Heavy Worker	2850	55
	Pregnancy	+350	+23
	Lactation (0 - 6 m)	+600	+19
	Lactation (6 - 12 m)	+520	+13
Infants	0 - 6 months	92/kg	1.16/kg
	6 - 12 months	80/kg	1.69/kg

   In the given question, for an adult pregnant woman with heavy work recommended daily energy intake will be: 2850 + 300 = 3150 Kcal
   Similarly, daily protein intake for such a woman will be 78 gm
   - Total additional energy requirement in a pregnancy, over and above normal metabolic requirements is + 60,000 Kcal
   - On an average a healthy adult woman gains 12 kg in pregnancy (6.5 kg in poor Indian women).

2. **Ans. NONE (Now 600 kcal)** *[Ref. Park 23/e p634]*

Also Remember

- *Requirement of Iron and Folic Acid:* Pregnancy > Lactation
- *Requirement of Calcium and Pyridoxine:* Pregnancy = Lactation
- *Requirement of other Nutrients:* Pregnancy < Lactation
- *Requirement of Iron:* Non-pregnant state = Lactation
- *Requirement of Vitamin B12 and C:* Non-pregnant state = Pregnancy

3. **Ans. (d) 2900** *[Ref. Park 23/e p634]*
4. **Ans. (b) 1.0** *[Ref. Foundations of Community Medicine, 1/e p369]*
   - A 'Consumption Unit' is a coefficient of dietary intake, which varies between individuals based on the basis of their age, sex and physical activity
   - Appraisal of dietary intake of very family by weighment method is worked out in terms of consumption units
   - Consumption Unit Coefficients (CUC) of an adolescent = 1.0
5. **Ans. (d) 0.7 gm/kg in terms of Egg protein & 1.0 gm/kg in terms of mixed vegetable protein** *[Ref. Foundations of Community Medicine, 1/e p369]*
   - *Protein requirement of an adult:*
     - 0.7 gm/kg/day in terms of Egg protein or
     - 1.0 gm/kg/day in terms of mixed vegetable protein (NEW GUIDELINE: 0.83 g/kg/d)
   - Egg protein has the highest NPU of 96
   - Indian Council of Medical Research (ICMR) has recommended 1.0 gm protein per kg of body weight for an Indian adult, assuming a NPU of 65 for dietary proteins.

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6. **Ans. (c) Energy** *[Ref. Nutrient Requirements and RDAs for Indians, ICMR; p4; Park 21/e p585, Park 22/e p587]*
   - *Recommended Dietary Allowance (RDA):* Is a level of intake corresponding to Mean + 2 Standard Deviation, which covers requirement of 97.5 % of population
   - RDA is safe level of intake which is likely to be inadequate in not more than 2.5 % population
   - RDA 'safe level approach' is NOT USED FOR ENERGY since excess energy intake is undesirable; For energy only mean or average requirement is defined as RDA.

Also Remember

	Reference Indian Man	Reference Indian Woman
Age	18-29 years	18-29 years
Weight	60 kg	55 kg
Height	1.73 metres	1.61 metres
BMI	20.3	21.2
Others	Free from disease, fit for active work; engaged in 8 hours of occupation (usually moderate activity), 8 hours in bed, 4-6 hours in sitting & moving about and 2 hours in walking and in active recreation or household duties	
Calculation	Average of values of age category 18-19 years, 20-24 years and 25-29 years	

7. **Ans. (a) 60 g/ day** *[Ref. Nutrient Requirements and RDAs for Indians, ICMR; p4; Park 21/e p583-84, Park 22/e p858-586]*
   In the given question, For a 60 kg Indian male, the minimum daily protein requirement with 40 g (mean) ± 10 (Standard deviation), will be,
   Mean + 2 SD = 40 + 2(10) = 60 g/day
   - RDA 'safe level approach' is Not used for energy since excess energy intake is undesirable; For energy only mean or average requirement is defined as RDA.
8. **Ans. (d) 2900 kcal** *[Ref. K. Park 23/e p634]*
   - Reference Man requires daily energy intake of 45 Kcal/kg
   - Reference Woman requires daily energy intake of 40 Kcal/kg.

Also Remember

- WHO recommends reduction in energy intake after age of 40 years
  - 5% per each decade till age 60 years and
  - 10% per each decade thereafter

9. **Ans. (c) 1 gm/kg body weight (Now 0.83g/kg by body weight)** *[Ref. Park 21/e p586, Park 22/e p588]*
10. **Ans. (b) 0.95 [0.86 ACTUAL VALUE]** *[Ref. RDA Draft Guidelines, NIN< Government of India, 2010]*
11. **Ans. (a) 2500 cal** *[Ref. K. Park 23/e p634]*
12. **Ans. NONE [NEW GUIDELINES: 60 and 55 Kg]** *[Ref. K. Park 23/e p632]*
13. **Ans. (b) 50 kg weight** *[Ref. Park 23/e p632]*
    REFERENCE INDIAN WOMAN
    - Age 18-29 years, Weight 55 kg
    - Height 1.61 metres, BMI 21.2
    - Non-pregnant, Non-lactating, Free from disease, Fit for active work
    - Engaged in 8 hours of occupation (usually moderate activity), 8 hours in bed, 4-6 hours in sitting & moving about, 2 hours in walking and in active recreation or household duties

Review Questions

14. **Ans. (b) 150** *[Ref. Park 21/e p585, Park 22/e p587]*
15. **Ans. (a) Fe** *[Ref. Gupta & Mahajan 3/e p 358; Park 21/e p575-76, Park 22/e p577-79]*
16. **Ans. (d) <2000 Kcal** *[Ref. Park 23/e p634]*
17. **Ans. (c) 460 and 40 grams** *[Ref. Park 21/e p613, Park 22/e p615]*
18. **Ans. (b) 100 (Now 92)** *[Ref. K Park 23/e p634]*

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PROTEINS

19. Ans. NONE *[Ref. Park 23/e p634]*

- *Net Protein Utilization (NPU):* Is the proportion of ingested proteins that is retained in the body under specified conditions for the maintenance and/or growth of the tissues
- NPU is a good indicator of protein quality for recommending the dietary protein requirement.

Also Remember

- *Methods of Assessing Protein Quality: [NEW GUIDELINES 2014]*
  - Digestible indispensable Amino Acid Score (DIAAS) BEST indicator
  - Protein Digestibility Corrected Amino Acid Score (PDCAAS)
  - Amino Acid Score (AAS)
  - Protein Efficiency Ratio (PER): It represents the ratio of weight gain to the amount of protein consumed
  - Biological Value (BV): Measures the amount of nitrogen retained in comparison to the amount of nitrogen absorbed
  - Net Protein Utilization (NPU): The ratio of the nitrogen used for tissue formation versus the amount of nitrogen digested.

20. Ans. (c) 15-20% *[Ref. Park 23/e p634]*

- Assessment of protein quantity is done by 'Protein-Energy Ratio' (PE).

$$\text{PE percent} = \frac{\text{Energy from protein}}{\text{Total energy in diet}} \times 100$$

- It is recommended that protein should account for approximately 15 - 20% of total daily energy intake
- If PE is less than 4 percent, then the subject will be unable to eat enough to satisfy protein requirements.

21. Ans. (a) Net Protein Utilization *[Ref. Park 23/e p634]*

22. Ans. (c) Tyrosine & Cysteine *[Ref. & Foundations of Community Medicine, 1/e p369]*

- Conditionally Essential Amino Acids (CEAA): Non-essential amino acids may turn essential if their precursors are limited in the body
  - There are 2 CEAA, namely, Tyrosine (derived from Phenyalanine) and Cyteine (derived from methionine)

Also Remember

- Other CEAA include Arginine, Glutamine, Taurine and Glycine.

23. Ans. (a) The gain in weight of young animals per unit weight of protein-consumed *[Ref. Dictionary of Public Health, Dr. Jugal Kishore; p423-24, Park 23/e p634]*

- Protein efficiency ratio (PER) is based on the weight gain of a test subject divided by its intake of a particular food protein during the test period
  - From 1919 until very recently, the PER had been a widely used method for evaluating the quality of protein in food

24. Ans. (d) Soya bean *[Ref. Park 23/e p610]*

- Soya bean is richest among pulses. It contains 43.2 % proteins (other pulses contain 17 - 25 % proteins)
- 100 gms Soya bean contain 43 gms proteins, 20 gms fat and 4 gms minerals
- Limiting amino acid in soya bean is methionine
- NPU of soya bean is 55.
- Soyabean also has higher fats, calcium, iron, vitamin B1/B2/B3 than other pulses.

Also Remember

- 'Egg is the reference protein' having NPU of 96.

25. Ans. (b) Lysine and threonine *[Ref. Park 23/e p609]*

- Amino acids most deficient in proteins of a food item are 'Limiting amino acids'

Food Item	Limiting Amino Acid(s)
Cereals	Threonine (& Lysine)
Pulses	Methionine (& Cysteine)
Maize	Tryptophan (& Lysine)

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- Deficiency develops due to only consumption of a particular type of food item with limiting amino acids (for e.g. wheat); Thus two or more food items are eaten together so that their proteins supplement one another; this is known as 'Supplementary Action of Proteins'

Also Remember

- *Essential Amino Acids (EAA):* Amino acids which are not synthesized in adequate amounts in the human body; so they have to be supplemented in diet from outside to prevent deficiency.
  - There are 10 EAA, namely, Phenylalanine, Valine, Threonine, Tryptophan, Isoleucine, Methionine, Histidine, Arginine, Leucine, Lysine
    (Mnemonic: PVT TIM HALL or **A**ny **H**elp **I**n **L**earning **T**hese **L**ittle **M**olecules **P**roves **T**ruly **V**aluable)
  - Histidine and Arginine are semi-essential amino acids.

26. **Ans. (b) Methionine** *[Ref. Park 23/e p628]*
27. **(d) 1 gram protein is equivalent to 1 gram Nitrogen** *[Ref. K. Park 23/e p634]*
    - 1 gram of proteins is equivalent to: 6.25 grams Nitrogen
    - NPU of India diets: 50-80
28. **Ans. (b) Pulses** *[Ref. K. Park 23/e p628]*
29. **Ans. (c) Histidine, Arginine** *[Ref. K. Park 23/e p609]*
30. **Ans. (b) Wheat** *[Ref. K. Park 23/e p627]*
31. **Ans. (a) Egg** *[Ref. K. Park 23/e p630]*
32. **Ans. (c) Methionine and cysteine** *[Ref. K. Park 23/e p628]*
33. **Ans. (a) Methionine** *[Ref. K. Park 23/e p628]*
34. **Ans. (b) Net protein utilization** *[Ref. K. Park 23/e p634]*
35. **Ans. (d) Lysine & Methionine** *[Ref. Park 23/e p610]*
36. **Ans. (b) 0.83 g/kg/d** *[Ref. RDA 2010 Draft Guidelines NIN, p109]*
    - RDA Safe Protein Requirement of High Quality Protein:
      - 1-5 years age: 0.94 g/kg/d
      - 6-10 years old children: 0.91 g/kg/d
      - Adolescent boys: 0.88 g/kg/d
      - Adolescents girls: 0.86 g/kg/d
      - Adult man/woman: 0.83 g/kg/d
37. **Ans. (a) 1.5 grams** *[Ref. RDA 2010 Draft, GOI p98]*
    - Protein requirement of infants:
      - 1 month age: 1.41 grams
      - 2 month age: 1.23 grams
      - 3 month age: 1.13 grams
      - 4 month age: 1.07 grams
      - 6 month age: 0.98 grams

Review Questions

38. **Ans. (b) Soyabean** *[Ref. Park 23/e p628]*
39. **Ans. (b) Methionine** *[Ref. Park 23/e p627]*
40. **Ans. (a) Egg** *[Ref. Park 23/e p630]*
41. **Ans. (b) Net protein utilization** *[Ref. Park 23/e p634]*
42. **Ans. (c) Egg** *[Ref. Park 23/e p630]*
43. **Ans. (b) Lysine** *[Ref. Park 23/e p627]*

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44. Ans. (b) Net protein utilization *[Ref. Park 23/e p634]*

45. Ans. (b) 67 *[Ref. OP Ghai Paediatrics, 6/e p94]*

FATS AND CARBOHYDRATES

46. Ans. (b) a-Linolenic acid *[Ref. Internet 3]*

- *Essential fatty Acids (EFA):*

Type of fatty acids	Type of chain	Examples
ω-3 Fatty Acids	Short chain	α-Linolenic acid
	Long chain	Eicosapentaenoic acid
		Docosahexaenoic acid
ω-6 Fatty Acids	Short chain	Linoleic Acid
	Long chain	Arachidonic acid
		γ-Linolenic acid
		Dihomo-γ-Linolenic acid

Also Remember

- Safflower oil is the richest source of Linoleic acid, most important Essential fatty Acid
- Flaxseed Oil is the richest source of Linolenic Acid
- Fish is the richest source of Eicosapentaenoic acid.

47. Ans. (b) Soya bean oil *[Ref. Park 23/e p611]*

- *Fatty acid content of different fats (%):*

Fats	SFA*	MUFA*	PUFA*
Coconut oil	92	6	2
Safflower oil	10	15	75
Sunflower seed oil	8	27	65
Soya bean oil	14	24	62
Margarine	25	25	50
Groundnut oil	19	50	31
Palm oil	46	44	10
Butter	60	37	3

(*SFA: Saturated Fatty Acids; MUFA: Mono-unsaturated Fatty Acids; PUFA: Poly- unsaturated Fatty Acids)

48. Ans. (c) 30 gm *[Ref. Park 23/e p613]*

- *Suggested intake of dietary fat:*

Group	Fat intake (g/(d)	EFA (energy %)
Adult (Man/Woman)	20	3
Pregnant woman	30	4.5
Lactating mother	45	5.7
Older children	22	3
Young children	25	3

49. Ans. (a) Linoleic Acid *[Ref. Park 23/e p610]*

- *Essential Fatty Acids (EFA):* Are those that cannot be synthesized in human body; they can only be derived from the food
- The most important EFA is Linoleic Acid, which serves as a basis for production of other EFA

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- *Dietary sources of EFA:*

EFA	Dietary source	% content
Linoleic Acid	Safflower Oil	73
	Corn Oil	57
	Sunflower Oil	56
	Soyabean oil	51
Arachidonic Acid	Meat, Eggs	0.5
	Milk (fat)	0.5
Linolenic Acid	Soyabean oil	7
Eicosapentanoic Acid	Fish oil	10

Also Remember

- EFA deficiency lead to 'Phrenoderma' (Toad Skin): It is characterized by rough rash like eruptions on the back and sides of arms and legs, the back, and the buttocks. It can be cured by giving 'linseed of safflower oil' which are rich in EFAs

50. Ans. (b) B C A *[Ref. Park 21/e p585, Park 22/e p587]*

Also Remember

- *Energy yield of macro-nutrients (Proximate principles):*

Nutrient	Energy yield
Carbohydrates	4 Kcal per gram (17 KJ)
Proteins	4 Kcal per gram (17 KJ)
Fats	9 Kcal per gram (37 KJ)

- Alcohol yields 7 kcal per gram
- Carbohydrates, fats and proteins form the main bulk of food; thus they are known as 'Macronutrients' or 'Proximate principles'
- In 'Balanced Diet',
  - Proteins should constitute 10 - 15 % of total daily energy intake
  - Fats should constitute 15 - 30 % of total daily energy intake
  - Carbohydrates, rich in fibre, should constitute the remaining of energy.

51. Ans. (c) Cereals are deficient in lysine and pulses are deficient in methionine *[Ref. Park 23/e p626-628]*

52. Ans. (c) Bajra *[Ref. Park 23/e p628]*

- *Fat content of food items:*

Food item	Fat content (per 100 grams)
Jowar	1.9
Bajra	5.0
Ragi	1.3
Rice	0.5
Wheat	1.5
Maize	3.6

53. Ans. (c) Coconut oil *[Ref. Park 23/e p611]*

54. Ans. (c) Omega-3 fatty acids *[Ref. Internet, Wikipedia]*

- Omega-3 fatty acids reduce incidence of CHD.

55. Ans. (c) 100 grams *[Ref. K. Park 23/e p661-662]*

56. Ans. (d) Fruits *[Ref. K. Park 23/e p614]*

57. Ans. (b) 1, 2 and 3 *[Ref. Park 23/e p611]*

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Review Questions

58. **Ans. (b) Safflower oil** *[Ref. Park 23/e p611]*
59. **Ans. (a) Egg** *[Ref. Park 23/e p630]*
60. **Ans. (b) Sunflower oil** *[Ref. Park 23/e p611]*
61. **Ans. (a) 10-30** *[Ref. Park 23/e p613]*

VITAMINS

62. **Ans. (b) Vitamin B3** *[Ref. Harrison, 15/e p463; Park 23/e p619]*

PELLAGRA

- Pellagra occurs due to Vitamin B3 (Niacin) deficiency
- Pellagra is characterized by 4 D's:
  - Diarrhoea
  - Dermatitis
  - Dementia
  - Death
- Skin rash in pellagra may appear as pigmented and scaly in areas exposed to sunlight. Esp. neck when it is known as 'Casal's Necklace'

Also Remember

- Pellagra is common in maize/jowar eating populations:
  - Limiting amino acid in maize is Tryptophan. 60 mg Tryptophan is converted to 1 mg Niacin in the body
  - Excess of leucine' in such populations appears to interfere in conversion of tryptophan to niacin

63. **Ans. (d) 1.0%** *[Ref. Park 23/e p615-616]*
- *Prevalence criteria for determining the Xerophthalmia problem in a community*

Criteria	Prevalence
Night blindness	> 1.0%
Bitot's spots	> 0.5%
Corneal xerosis/corneal ulceration/ keratomalacia	> 0.01%
Corneal ulcer	> 0.05%
Serum retinol (< 10 mcg/dl)	> 5.0%

- Prevalence is measured in population at risk, i.e., pre-school children 6 months - 6 years.

64. **Ans. (a) 500 mcg** *[Ref. Park 23/e p620]*
- Body stores of folate are not large (about 5 - 10 mg), therefore folate deficiency can develop quickly
- *Recommended daily intake values of folate:*

Group	Intake per day
Healthy adults	200 mcg
Pregnancy	500 mcg
Lactation	300 mcg
Children	100 mcg

- *An adult tablet of IFA contains:* 100 mg elemental Iron and 500 mcg Folic acid (to be given for 100 days minimum in pregnancy)
- *A pediatric tablet of IFA contains:* 20 mg elemental Iron and 100 mcg Folic acid (to be given for 100 days minimum every year till 5 years age of child)

65. **Ans. (b) 1 Lakh IU** *[Ref. National Health Programs of India by Dr. J. Kishore, 5/e p207; Park 23/e p616]*
66. **Ans. (b) Conjunctival xerosis** *[Ref. Park 23/e p615-616]*
- All the ocular manifestations of Vitamin-A deficiency are collectively known as 'Xerophthalmia' (Dry Eye)
  - Xerophthalmia is most common in children aged 1 - 3 years

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- 'First clinical sign' of Vitamin-A deficiency: Conjunctival xerosis
- 'First clinical symptom' of Vitamin-A deficiency: Night blindness
- Conjunctival xerosis in Xerophthalmia has a characteristic appearance of 'emerging like sand banks at receding tide
- 'Bitot's Spots' are triangular, pearly-white or yellowish, foamy spots on bulbar conjunctiva, on either side of cornea; In young children they indicate Vitamin-A deficiency, whereas in adults they are often inactive sequelae of earlier disease

67. Ans. (c) 9 lac IU *[Ref. Park 23/e p616]*

- *Under National Immunisation Schedule (NIS), Vitamin-A is given;* (Older Guidelines)
  - 1 lac IU at 9 months age (along with measles vaccine),
  - 2 lac IU every six months thereafter, till the age of 3 years (at 18, 24, 30 and 36 months of age)
  - A total of 9 lac IU is given
- Vitamin-A is administered by a '2 ml spoon'
- *Strength of Vitamin-A solution:* 1 lac IU per ml
- *Under the New Guidelines in Nis, Vitamin-A is given;*
  - 1 lac IU at 9 months age (along with measles vaccine),
  - 2 lac IU every six months thereafter, till the age of 5 years (at 18, 24, 30, 36, 42, 48, 54 and 60 months of age)
  - A total of 17 lac IU is given

68. Ans. (c) 1,00,000 IU per ml *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p202]*

69. Ans. (b) 0.5 % *[Ref. Park 23/e p617]*

70. Ans. (c) 600 mcg *[Ref. Park 23/e p616]*

Also Remember

- *Recommended daily requirements:*

Vitamin	Recommended daily requirement
Vitamin A	600 mcg retinol
Vitamin B1 (Thiamine)	0.5 mg per 1000 Kcal of energy intake
Vitamin B2 (Riboflavin)	0.5 mg per 1000 Kcal of energy intake
Vitamin B3 (Niacin)	6.6 mg per 1000 Kcal of energy intake
Vitamin B5 (Pantothenic Aci(d)	10 mg
Vitamin B6 (Pyridoxine)	2 mg
Vitamin B9 (Folic Aci(d)	100 mcg
Vitamin B12 (Cobalamin)	1 mcg
Vitamin D	100 IU (2.5 mcg calciferol)
Vitamin E (Tocopherol)	0.8 mg per gm of essential fatty acids
Vitamin K	0.03 mg per kg

71. Ans. (a) 5 min *[Ref. Park 23/e p617]*

- Vitamin D can be synthesized in the body in adequate amounts by simple exposure to sunlight even for 5 minutes per day
- Vitamin D is synthesized in sunlight when '7-dehydrocholesterol (present in abundance in skin) is converted to cholecalciferol'
- 'UV-B rays' (wavelength 270 - 300 nm) play an important role in Vitamin D synthesis
- Vitamin D is 'Kidney Hormone'
- Two major forms of Vitamin D are D2 (Ergocalciferol/ calciferol) and D3 (Cholecalciferol)
- There is no plant source for Vitamin D (and Vitamin B12)
- Vitamin D deficiency leads to rickets, osteomalacia, osteoporosis and colon cancer.

72. Ans. (d) Death *[Ref. Harrison, 15/e p463]*

73. Ans. (c) Pantothenic acid *[Ref. Harrison, 15/e p465]*

- Pantothenic acid deficiency was thought to be cause of 'Burning Feet/Sole Syndrome' among prisoners of World War II
- Pantothenic acid is required by adrenal cortex.

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74. **Ans. (d) 1,00,000 IU** *[Ref. K. Park 23/e p616]*
    - *Community based intervention against nutritional blindness:*
      - Evolved by National Institute of Nutrition (NIN), Hyderabad
    - *Strategy:*
      - Administer a single massive dose of 200,000 IU of Vitamin A (Retinol palmitate) orally every six months to pre-school children (1 - 6 years age)
      - Half that dose (100,000 IU) be administered to children between 6 months - 1 year age
      - Also known as 'Immunization against Xerophthalmia'
      - Incidence of Keratomalacia reduced by 80%.
75. **Ans. (a) Pellagra** *[Ref. Park 23/e p619]*
76. **Ans. (b) 0.5%** *[Ref. Park 23/e p616]*
77. **Ans. (b) Seborrheic dermatitis** *[Ref. Park 23/e p615-616]*
78. **Ans. (a) Bitot's spot; (b) Xerophthalmia; (c) Night blindness** *[Ref. Park 23/e p615-616]*
79. **Ans. (c) 0.03 mg/kg** *[Ref. K. Park 23/e p618]*
80. **Ans. (c) 200,000 IU** *[Ref. Maternal Child Nursing Care by SE Perry, 5/e p973]*
81. **Ans. (a) 350 mcg** *[Ref. K. Park 23/e p616]*
82. **Ans. (d) Cod liver oil [BUT Richest source is Halibut liver oil]** *[Ref. K. Park 23/e p617]*
83. **Ans. (a) Fortified in all wheat products in India like as in USA** *[Ref. K Park 23/e p620]*
    FOLIC ACID
    - India has NOT YET adopted recommendation of fortification of all wheat products in India with Folic acid
    - Preconceptionally given for prevention of neural tube defects
    - It is present in leafy vegetables, spinach, paneer
    - Requirement per day in pregnancy is 500 mcg
84. **Ans. (c) Excess of Leucine** *[Ref. K. Park 23/e p619]*
85. **Ans. (c) Biotin** *[Ref. Vitamin Binding Proteins by Dakshinamurti, 1/e p214]*
86. **Ans. (d) Calcitriol** *[Ref. William's Basic Nutrition & Diet Therapy, 14/e p99]*
87. **Ans. (a) Conjunctiva** *[Ref. Park 23/e p615]*
88. **Ans. (b) Bitot's spot** *[Ref. Postgraduate Xerophthalmia (Volume 2) by Zia Choudhary, 1/e p591]*

WHO Classification of Xerophthalmia

Primary signs	Secondary signs
X1A Conjunctival xerosis	XN Night blindness
X1B Bitot spots	XF Xerophthalmic fundus
X2 Corneal xerosis	XS Xerophthalmic scarring
X3A Corneal ulceration	
X3B Keratomalacia	

89. **Ans. (b) Niacin** *[Ref. Park 23/e p619]*
90. **Ans. (c) 3** *[Ref. Guidelines for the inpatient treatment of severely malnourished children, WHO p23]*
    - *Vitamin A deficiency treatment:* Vitamin A on days 1, 2 and 14 each (for age >12 months, give 200,000 IU; for age 6-12 months, give 100,000 IU; for age 0-5 months, give 50,000 IU)
91. **Ans. (d) Halibut fish liver oil** *[Ref. Park 23/e p617]*
92. **Ans. (d) B6** *[Ref. Encyclopedia of Aging and Public Health by Loue, 1/e p813]*
    - Daily requirements of pyridoxine are directly related to protein intake
    - With a low protein diet, less vitamin is needed

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Review Questions

93. **Ans. (c) Bitot spots-0.5%** *[Ref. Park 23/e p616]*
94. **Ans. (a) Dryness of conjunctiva** *[Ref. Park 23/e p615-616]*
95. **Ans. (d) Folic acid** *[Ref. Park 23/e p620]*
96. **Ans. (d) All of the above** *[Ref. Gupta & Mahajan 3/e p335; Park 23/e p618]*
97. **Ans. (b) 200 IU** *[Ref. Park 23/e p617]*
98. **Ans. (a) Vitamin A intoxication** *[Ref. Park 23/e p616]*
99. **Ans. (d) Sitaphal** *[Ref. Park 23/e p629]*
100. **Ans. (a) Milk** *[Ref. Park 23/e p617]*
101. **Ans. (d) Megaoblastic anaemia** *[Ref. Park 23/e p620]*
102. **Ans. (b) 5.0 mcg (200 IU)** *[Ref. Park 23/e p617-618]*
103. **Ans. (a) Vitamin A** *[Ref. Park 23/e p148]*
104. **Ans. (d) Groundnut** *[Ref. Park 23/e p618]*
105. **Ans. (a) Bitot's spot** *[Ref. Park 23/e p615]*
106. **Ans. (c) Thiamine** *[Ref. Park 23/e p619]*
107. **Ans. (a) Bitot's spots 0.05%** *[Ref. Park 23/e p615-616]*
108. **Ans. (c) Pellagra** *[Ref. Park 23/e p619]*
109. **Ans. (c) Vit. A deficiency** *[Ref. Park 23/e p615-616]*
110. **Ans. (b) 600** *[Ref. Park 23/e p616]*
111. **Ans. (c) Indian goose berry** *[Ref. Park 23/e p621]*
112. **Ans. (c) INH therapy** *[Ref. Park 23/e p620]*

IRON

113. **Ans. (b) Serum ferritin** *[Ref. Park 23/e p623]*
    - *Evaluation of iron status in the body can be done by:*
        - *Hemoglobin concentration:* A relatively insensitive index of nutrient depletion
        - *Serum iron concentration:* Normal range is 0.80 - 1.80 mg/L
        - *Serum ferritin:* 'Most sensitive tool for evaluation of iron status', especially in populations with low prevalence of anemia
        - *Serum transferring saturation:* Normal value is 30%
114. **Ans. (a) less than 11 g/dl** *[Ref. Park 23/e p623]*
    - *Cut-off points for diagnosis of anemia (WHO):*

Group	Hb (g/dl)	MCHC (%)
Adult males	13	34
Adult females, non-pregnant	12	34
Adult females, pregnant	11	34
Children, 6 m - 6 y	11	34
Children, 6 y - 14 y	12	34

115. **Ans. (d) Soya bean** *[Ref. Park 23/e p628]*
    - Only Bengal gram contains Vitamin C among the common pulses

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Also Remember

- *Iron requirements (mg per day): (New Guidelines 2011)*

Groups	Particulars	Iron intake	Iron to be absorbed
Adult male		17	0.84
Adult female	Menstruating	21	1.65
	Pregnancy 1st half	35	0.8
	Pregnancy 2nd half	35	2.80
	Lactation	21	1.65
Infant	6 - 12 months	05	0.7
Children	1 - 12 years	10	0.6
Adolescent	Boys 13 - 16 years	32	1.6
	Girls 13 - 16 years	27	1.4

- Iron absorption from Indian diets is less than 5%.

116. Ans. (a) < 5% *[Ref. Park 23/e p623]*
- Iron absorption from habitual Indian diets is less than 5%
- Iron absorption is low in Indian diets due to presence of inhibitors (phytates, tannates, oxalates, calcium)
- Vitamin C (Ascorbic aci(d) is a facilitator of iron absorption

117. Ans. (d) Serum ferritin *[Ref. Park 23/e p623]*

118. Ans. (a) Milk *[Ref. Park 23/e p628-629]*
- *Iron content of food items:*

Food item	Iron content (mg per 100 grams)
Jowar	4.1
Bajra	8.0
Ragi	3.9
Bengal gram	4.6
Horse gram	6.7
Peas dry	7.0
Soyabean	10.4
Banana	0.5
Mango	1.3
Sitaphal	4.3
Raisins	7.7
Dates	7.3
Milk	0.2 - 0.3

119. Ans. (b) High doses of Vitamin C *[Ref. K. Park 23/e p621]*

120. Ans. (a) 1000 mg *[Ref. Nutrition during Pregnancy by National Academy press, p282]*

121. Ans. (a) Pista *[Ref. Multiple sources]*

122. Ans. (d) Jaggery *[Ref. Multiple sources]*

Review Question

123. Ans. (a) 18 mg/d *[Ref. Park 23/e p623-624]*

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IODINE AND FLUORINE

124. Ans. (a) 0.5-0.8 mg/l *[Ref. Park 23/e p625]*

- The recommended level of fluorides in drinking water in India is accepted as '0.5 - 0.8 mg/litre' (0.5 - 0.8 ppm)
- In temperate countries where water intake is low, the optimum level of fluorides in drinking water is accepted as 1 - 2 mg/litre
- 'Fluorine is a double edged sword': Inadequate intake is associated with 'dental caries' whereas excess intake with 'dental and skeletal fluorosis'.

Also Remember

- *Daily requirement for Iodine for adults:* > 150 mcg.

125. Ans. (b) Central Incisors & 1st Molars *[Ref. Park 23/e p625]*

- Dental fluorosis occurs when excess fluoride is ingested during first 7 years of life (years of tooth calcification)
  - It occurs at levels above 1.5 mg/litre intake
  - It is characterized by 'Mottling', which is best seen on incisors of upper jaw.

Also Remember

- *Major source of fluorine to man:* Drinking water
- *Optimum level of fluorine in drinking water:* 0.5 - 0.8 ppm (0.5 - 0.8 mg/litre)
  - *Level > 1.5 ppm*: Dental fluorosis (mottling)
  - *Level 3.0 - 6.0 ppm*: Skeletal fluorosis
  - *Level > 10.0 ppm*: Crippling fluorosis

126. Ans. (c) Iodine + Iron *[Ref. Park 21/e p595, Park 22/e p597]*

- National Institute of Nutrition (Hyderabad) developed 'Twin Fortified Salt' also known as 'Double Fortified Salt' (DFS)
  - DFS contains Iron and Iodine
- DFS contains salt, potassium iodate, ferrous sulphate and sodium hexa meta phosphate
- DFS provides 40 mcg Iodine and 1 mg Iron per gram of salt.

Also Remember

- *Iodised Salt:* Level of iodisation in salt (PFA Act' 1954) is '30 ppm at production level and 15 ppm at consumer level'
- Iodised salt is most convenient, effective and economical method of mass prophylaxis in endemic areas
  - DEC Medicated Salt: 1 - 4 gm DEC (diethylcarbamazine) per kg salt is used for mass treatment of Filariasis; Treatment should be continued for 6 - 9 months.

127. Ans. (d) 40 mcg Iodine + 1 mg Iron *[Ref. Internet]*

128. Ans. (d) 30 ppm at Production level & 15 ppm at consumer level *[Ref. Park 23/e p643-644]*

- Iodisation of salt is the 'most widely used prophylactic measure against prevention of goiter'
  - Iodised salt is most convenient, effective and economical method of mass prophylaxis in endemic areas
- According to Prevention of Food Adulteration (PFA) Act' 1954:
  - *Level of iodisation*: Minimum'30 ppm at production level and 15 ppm at consumer level'
  - *Moisture content*: < 6.0% by weight
  - *Sodium chloride*: > 96.0% by weight.

Also Remember

- *Iodine requirement:* 150 mcg per day (<1 teaspoon over lifetime)
- Salt containing compound potassium iodide is termed 'Iodised salt' whereas salt containing compound potassium iodate is termed 'Iodated salt'
- *Global Iodine Deficiency Disorders (IDD) Day:* 21st October

Contd...

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Contd...

- *Criteria for tracking progress towards IDD elimination:*

Indicator	Goal
Proportion with enlarged thyroid (age 6 - 12 years)	< 5%
Urinary Iodine Excretion below 100 mcg/litre	< 50%
Urinary Iodine Excretion below 50 mcg/litre	< 20%
Proportion of houses consuming adequately iodised salt	> 90%

129. Ans. (c) 3-4 years *[Ref. Park 23/e p644]*
- Intramuscular Iodised Oil (poppy-seed oil): Average dose 1 ml injection provided protection for 4 years
- Oral Iodised Oil: 2 ml dose is effective for 2 years

130. Ans. (c) 150 mcg *[Ref. Park 23/e p624]*
- The daily requirement of iodine is 150 mcg supplied normally by well balanced diets and drinking water.

Also Remember

- *Indicators for epidemiological assessment of iodine deficiency:*
  - Prevalence of goitre
  - Prevalence of cretinism
  - Urinary iodine excretion
  - Measurement of thyroid function (T4, TSH)
  - Prevalence of neonatal hypothyroidism
- *Some noteworthy daily requirements:*

Nutrient	Recommended daily requirement
Calcium	400 - 500 mg
Iron	17 mg (males); 21 mg (females)
Iodine	150 mcg
Fluorine	0.5 - 0.8 mg/litre

131. Ans. (c) 10% *[Ref. Assessment of IDD and monitoring their elimination, WHO, 3rd Ed.]*
- *Epidemiological criteria for assessing severity of IDD:*
  - Total Goitre Rate (TGR) - Grade I + Grade II
  - Median Urinary Iodine Excretion
  - Thyroid volume (ultrasound)
  - Salt iodine content
- *Criteria for Sustainable Elimination of IDD:*
  - Median Urinary Iodine Excretion 100 mcg/l
  - Level of iodization:
    1. 30 ppm at production level
    2. 15 ppm at consumer level
  - Total Goitre Rate (TGR) < 5%.

132. Ans. (a) 1 ppm *[Ref. Park 21/e p577, Park 22/e p579]*

133. Ans. (a) 30 ppm *[Ref. K. Park 23/e p643]*

134. Ans. (d) 250 mcg *[Ref. K Park 23/e p624]*
- India has recently adopted WHO guideline of 250 mcg per day in pregnancy
- Iodine requirement in Adult: 150 mcg per day

135. Ans. (b) 20 micro gram/day *[Ref. Mechanism of Iodine Deficiency, UN System documents, Chapter 6]*

136. Ans. (b) 15 PPM *[Ref. K Park 23/e p643]*

137. Ans. (d) 3:10 *[Ref. Fifth Report on the World Nutrition Situation: Nutrition for Improved Development Outcomes. 2004]*

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138. Ans. (d) None of the above *[Ref. Park 23/e p644]*

FLUORINE

- Recommended level of Fluorine intake: 0.5-0.8 mg/L
- Recommended level of Fluorine intake in temperate countries with Low water intake: 1-2 mg/L
- Recommended maximum guideline fluride in drinking water: 1.5 mg/L
- Dental caries occur at level: <0.5 mg/L
- Mottling of dental enamel occur at level: > 1.5 mg/L
- Skeletal fluorosis occur at level: 3.0-6.0 mg/L
- Crippling fluorosis occur at level: >10 mg/L

139. Ans. (c) 3.0-6.0 ppm *[Ref. Park 23/e p644]*

140. Ans. (d) >10 ppm *[Ref. Park 23/e p644]*

Review Questions

141. Ans. (d) 1.5 *[Ref. Park 21/e p577, Park 22/e p579]*

142. Ans. (c) 30 ppm *[Ref. Park 21/e p595, Park 22/e p597]*

143. Ans. (a) 0 - 3 months *[Ref. K Park 23/e p623]*

144. Ans. (a) Butter *[Ref. Park 23/e p628-629]*

145. Ans. (a) 100 mg *[Ref. Park 23/e p642]*

OTHER NUTRIENTS

146. Ans. (c) 7 cal *[Ref. Park 23/e p631]*

- Alcohol supplies about 7 Kcal/gm
- Energy yield of macro-nutrients (Proximate principles):

Nutrient	Energy yield
Carbohydrates	4 Kcal per gram (17 KJ)
Proteins	4 Kcal per gram (17 KJ)
Fats	9 Kcal per gram (37 KJ)

147. Ans. (c) 40 gm *[Ref. Park 23/e p614]*

- Dietary fibre is a non-starch polysaccharide and a physiologically important component of diet; there are two types of dietary fibres:
  - *Insoluble fibres*: Cellulose, hemi-cellulose and lignin
  - *Soluble fibres*: Pectins, gums and mucilages
- A daily intake of about 40 grams of fibre is desirable
- Indian diets provide about 50-100 grams of fibre per day
- Cereals and pulses are good sources of fibre (>10 gm fibre per 100 gm).

148. Ans. (c) Lead *[Ref. K. Park 23/e p621-626]*

- *Macronutrients:* Proximate Principles which form the bulk of the diet
  - Carbohydrates
  - Fats
  - Proteins
- *Micronutrients:* Vitamin and Minerals (which are required in small quantities).
  - Major minerals: Sodium, Potassium, Magnesium, Calcium, Phosphorus
  - Trace elements: Iron, Iodine, Fluorine, Zinc, Copper, Cobalt, Selenium, Chromium, Manganese, Molybdenum, Nickel, Tin, Silicon, Vanadium
  - Trace contaminant with no known function in body: Lead, Mercury, Barium, Boron, Aluminium.

149. Ans. None of the choices *[Ref. Vitamins-the fundamental aspects in nutrition and health by Gerald F. Combs, 3/e p 376]*

- Zinc deficiency
- Growth failure
- Sexual infantilism
- Impaired immunity
- Decreased insulin synthesis
- Delayed wound healing

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- Loss of taste (Aguesia)
- Liver disease (Hepatomegaly + Splenomegaly), Pernicious anemia, Thalassemia, Myocardial infarction
- Megaloblastic anemia (due to reduced absorption of Folyl-glutamates)
- Maternal zinc deficiency: Spontaneous abortion, Congenital malformation (Anencephaly), Low birth weight, IUGR, Preterm delivery.

150. Ans. (a) 20 mg/day *[Ref. Neonatal Formulary, 5/e p270]*

151. Ans. (b) 600 mg *[Ref. K Park 23/e p622]*

152. Ans. (b) 500 mg *[Ref. K Park 23/e p636]*

153. Ans. (a) Selenium *[Ref. Selenium in Food and Health by C Reilly, 5/e p91]*

154. Ans. (b) 400 mg [NEW GUIDELINE: 600 mg] *[Ref. K Park 23/e p636]*

155. Ans. (a) 1200 mg [Though Indian Guideliens Recommend 800 mg] *[Ref. Pathy's Principles of Geriatric Medicine 5/e p225]*

Calcium Requirements (Indian Guidelines)

- Adult male: 600 mg
- Adult female: 600 mg
- Pregnancy: 1200 mg
- Lactation: 1200 mg
- Post-menopausal: 800 mg
- Infants: 500 mg
- Children: 600 mg
- Adolescents: 800 mg

156. Ans. (b) Inherited disorder of impaired uptake of zinc from body *[Ref. NUTR by Beerman, 1/e p217]*

157. Ans. (b) 0.01% *[Recent Question 2014]*

158. Ans. (d) Excessive Appetite *[Ref. Park 23/e p625]*

- *Zinc deficiency:* Growth failure. Sexual infantilism, Loss of taste, Delayed wound healing, Loss of integrity of immune system, Spontaneous abortions, Congenital malformations, Low birth weight, IUGR, Preterm delivery, Skin lesions, Depressed appetite, Skeletal abnormalities

Review Questions

159. Ans. (a) Selenium *[Ref. Park 23/e p626]*

160. Ans. (c) 5-15 ppm *[Ref. Park 23/e p643]*

161. Ans. (b) Hyperactivity *[Ref. Park 21/e p576, Park 22/e p578]*

162. Ans. (d) 2.0 mg/L *[Ref. Park 23/e p644]*

163. Ans. (b) 1 *[Ref. Park 23/e p644]*

164. Ans. (a) Nalgonda *[Ref. Park 23/e p644]*

165. Ans. (c) Zinc *[Ref. Park 23/e p625]*

166. Ans. (a) Dates *[Ref. Park 21/e p581, Park 22/e p583]*

167. Ans. (d) All of the above *[Ref. Park 23/e p625]*

168. Ans. (d) All of the above *[Ref. Park 23/e p625]*

169. Ans. (c) Increased biological value and +NPU *[Ref. Park 23/e p630]*

EGG

170. Ans. (b) Carbohydrate & Vitamin C *[Ref. Park 23/e p630]*

Food Items as Poor Sources of Nutrients:

- Milk is a poor source of Vitamin C and Iron
- Meat is a poor source of Calcium
- Fish is a poor source of Carbohydrates
- Egg is a poor source of Vitamin C and Carbohydrates

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Also Remember

- An egg (60 grams) contain: 6 gm proteins, 6 gm fat, 30 mg calcium, 1.5 mg iron, 250 mg cholesterol and 70 kcal energy
- Egg protein is best among proteins (NPU = 96), thereby making it 'Reference Protein'

171. Ans. (b) 96 *[Ref. Foundations of Community Medicine, 1/e p369; Park 23/e p630, 634]*

- *Net Protein Utilization (NPU):* Provides a complete expression of 'protein quality'

$$\text{NPU} = \frac{\text{Nitrogen retained by body}}{\text{Nitrogenintake}} \times 100$$

$$\text{NPU} = \frac{\text{Biological value} \times \text{Digestibility coefficient}}{100}$$

- *NPU of selected food items:*

Food Item	Net Protein Utilization
Egg (hen)	96*
Milk (cow)	81
Meat	79
Fish	77
Rice	65
Soyabean	55
Wheat	51
Grams (pulses)	45-50
Groundnut	50

(*NPU of egg is 96. Since egg is 'reference protein', its NPU is taken as 100 for comparison)

172. Ans. (c) C *[Ref. K Park 23/e p630]*

Review Questions

173. Ans. (c) Carbohydrate *[Ref. Park 23/e p630]*

174. Ans. (b) It has best quality of protein *[Ref. Park 23/e p630]*

175. Ans. (c) Carbohydrate *[Ref. Park 23/e p630]*

176. Ans. (b) 58% *[Ref. Park 23/e p630]*

177. Ans. (c) 70 *[Ref. Park 23/e p630]*

178. Ans. (b) Vit. C *[Ref. Park 23/e p630]*

179. Ans. (c) C *[Ref. Park 23/e p630]*

MILK

180. Ans. (b) 65°C for 30 minutes *[Ref. Park 23/e p655]*

- *Methods of Pasteurization:*

Method	Temp	Time	Remarks
Holder/Vat Method	63-66°C	>30 min	For small and rural communities
HTST Method	72°C	>15 sec	Most widely used; for large quantities; 'Flash Pasteurization'
HHST Method	68°C	30 min	'Batch Pasteurization'
UHT Method	125°C	Few sec	Heating in 2 stages; 2nd stage under pressure

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Also Remember

- *Some other noteworthy temperatures:*

Method/Procedure	Temperature
Incineration	Primary Chamber: 800° ± 50°C Secondary Chamber: 1050° ± 50°C
Autoclave	121°C at 15 psi for 15 min 135°C at 3 - 10 psi for 30 min
Cold Chain	+2° to +8°C
OPV (Long term storage)	–20° to –40°C
Yellow fever vaccine	–30° to +5°C
Reverse Cold Chain	+2° to +8°C
Parboiling (Hot Soaking)	65° - 70°C
Comfort Zone (Effective temp)	25 - 27°C
Heat exhaustion	> 102°F
Heat hyperpyrexia	> 106°F
Heat stroke	> 110°F

181. Ans. (d) Methylene blue reduction test *[Ref. Park 23/e p655]*

- *Tests of Pasteurized Milk (for adequacy/sufficiency of pasteurization):*
  - Phosphatase Test: Widely used test
  - Standard Plate Count: Enforced limit is 30,000 bacterial count per ml of pasteurized milk
  - Coliform Count: Standard is coliforms be absent in 1 ml of milk
- *'Methylene Blue Reduction Test':*
  - Is an indirect method for detection of microorganisms in milk
  - The test is 'carried out on milk accepted for pasteurization'
  - Blue colour disappears from milk when held at a uniform temperature of 37° C: Milk which remains blue the longest is of best quality

182. Ans. (c) Vitamin C *[Ref. Park 23/e p630]*

- Milk is a good source of all vitamins except Vitamin C.

Also Remember

- *Milks available in India:*

Milk Type	Fat content	SNF (Solid-not-fat) content
Full cream	6.0 %	9.0 %
Standardised	4.5 %	8.5 %
Toned	3.0 %	8.5 %
Double toned	1.5 %	9.0 %
Skimmed	0.5 %	8.7 %

183. Ans. (c) 1.1 gm *[Ref. Park 23/e p630]*

184. Ans. (c) Iron; (e) Vitamin C *[Ref. Park 23/e p630]*

185. Ans. (a) Cow's milk contains 80% whey protein and not casein *[Ref. K. Park 23/e p630]*

186. Ans. (a) Phosphatase test *[Ref. K. Park 23/e p655]*

187. Ans. (c) Human milk, Curd (Cow's milk), Buffalo milk, Cheese *[Ref. Park 23/e p630]*

- *Fat content of milk (gm per 100 ml):* Human (3.3) < Cow (4.1) < Goat (4.5) < Buffalo (6.5) < Cheese (9-20)

188. Ans. (d) 1, 2 and 3 *[Ref. Milk Processing and Quality Management by Tamime, 1/e p54]*

MILK BORNE DISEASES

189. Ans. (a) Brucellosis; (b) Tuberculosis; (d) Q-fever; (e) Leptospirosis *[Ref. K. Park 23/e p655]*

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Infections of animals transmitted to man	
Primary importance	*Lesser importance*
Tuberculosis	Anthrax
Brucellosis	Cow pox
Streptococcal infections	Foot and mouth disease
Staphylococcal poisoning	Leptospirosis
Salmonellosis	Tick-borne encephalitis
Q fever	

Infections primary to man	
Diarrhoeal diseases	*Non-diarrhoeal diseases*
Typhoid and para-typhoid fevers	Tuberculosis
Shigellosis	Diphtheria
Cholera	Streptococcal infections
E. coli	Staphylococcal food poisoning
	Enteroviral infections
	Hepatitis viral

190. (c) Docosahexanoic acid *[Ref. Nutrition and Metabolism, 1/e, Section 8.5]*

- Breast milk contains higher amounts of Docosahexaenoic acid (DHA)
  - DHA is an omega-3 fatty acid required for brain development
  - Levels in breast milk depend on mother's consumption of foods rich in omega-3 fatty acids namely, flax and fish
  - Longer the duration of breast feeding, higher the DHA levels in infants.

191. Ans. (c) Increased proteins *[Ref. Nutrition through Life Cycle by Judith E Brown, 3/e p160]*

192. Ans. (c) Vitamin D [Vitamin D is in Least Quantity] *[Ref. Understanding Nutrition by Whitney & Rolfes, 12/e p533]*

193. Ans. (a) Quality of pasteurization *[Ref. K Park 23/e p655]*

194. Ans. (a) 6 months *[Ref. K Park 23/e p530]*

195. Ans. (a) 65°C for 30 min *[Ref. K Park 23/e p655]*

Review Questions

196. Ans. (a) Iron *[Ref. Park 23/e p539-540]*

197. Ans. (a) Quality of Pasteurization *[Ref. Park 23/e p655]*

198. Ans. (a) Low lactose (b) Contains more Vitamin-D *[Ref. Park 23/e p539-540]*

199. Ans. (d) Endemic typhus *[Ref. Park 23/e p655]*

200. Ans. (a) Human milk *[Ref. Park 23/e p540]*

201. Ans. (c) Ascorbic acid *[Ref. Park 23/e p540]*

202. Ans. (c) 7.2 gm *[Ref. Park 23/e p540]*

203. Ans. (a) Lactose *[Ref. Park 23/e p540]*

OTHER FOOD ITEMS

204. Ans. (c) a-IV, b-III, c-I, d-II *[Ref. Park 23/e p615, 621, 634]*

Also Remember

- Among common vegetables, cabbage is the richest source of Vitamin C. (But also a Goitrogen)

205. Ans. (d) Lysine *[Ref. Park 23/e p629]*

- Rice is a poor source of Thiamine, Calcium, Iron and Vitamins A, D, C
- Protein content of rice varies from 6 - 9%
  - 'Rice proteins are better than other cereal proteins' as rice is richer in lysine
- Rice is staple food of > 50 % population globally.

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Also Remember

- Food Items as Rich Sources of nutrients:
  - Halibut Liver Oil is richest source of Vitamin A and Vitamin D
  - Indian Gooseberry (amla) is richest source of Vitamin C
  - Gingelly seeds are richest source of Vitamin B1 (Thiamine)
  - Sheep liver is richest source of Vitamin B2 (Riboflavin)
  - Ragi (millet) is a rich source of calcium
  - Pistachio is the richest source of iron.

206. Ans. (b) 40% *[Ref. Park 23/e p628]*

Also Remember

- *Protein content of some foods:*

Food Item	Protein content (gm % per 100 gms)
Soyabean	43
Pulses	22-25
Fish	21
Meat	20
Egg (hen)	13
Wheat	12
Rice	7
Milk (cow)	3

207 . (b) Iodine *[Ref. K. Park 23/e p624]*

- Richest source of Vitamin A and D is fish liver oils (especially Halibut fish)
- Rich source of proteins (15-20%)
- Rich source of Calcium, phosphorus, fluorides
- Good source of iron
- Poor source of Carbohydrates
- Poor source of iodine (barring few sea fish)

208. Ans. (b) Calcium 39 mg; (c) Beta carotene 6 micrograms; (d) Calories 280 Kcal *[Ref. Multiple sources]*

209. Ans. (b) Citric acid *[Ref. Food Processing by Arthur & Ashurst, 1/e p32]*

210. Ans. (b) Phosphorus; (c) Vitamin B6; (d) Vitamin C; (e) Potassium *[Ref. Encyclopedia of Foods: A Guide to Healthy Nutrition, 1/e p158]*

- Banana is a good source of:
  - Vitamins A, B6, C
  - Carbohydrates, Energy
  - Fibre
  - Potassium, Phosphorus
- Banana is NOT a good source of:
  - Calcium, Iron (Due to presence of phytates)
  - Zinc

211. Ans. (d) Ascorbic acid *[Ref. The Lentil by Erskine, 1/e p419]*

FERMENTATION OF PULSES

- Increase content of B complex vitamins (Thiamine, Riboflavin, Niacin, Biotin, Cyanocobalamin)
- Decrease phytate and trypsin inhibitors
- Increase ionisable iron content

Review Questions

212. Ans. (b) Soyabean *[Ref. Park 23/e p628]*

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213. **Ans. (c) Ragi** *[Ref. Park 23/e p621]*

214. **Ans. (a) Beriberi** *[Ref. Park 23/e p627]*

215. **Ans. (b) Iron** *[Ref. Park 23/e p629]*

216. **Ans. (a) Banana** *[Ref. Elizabeth's nutrition & child development 2/e p67; Park 23/e p629]*

217. **Ans. (d) Ragi** *[Ref. Park 23/e p628]*

218. **Ans. (a) Leucine** *[Ref. Park 23/e p627]*

219. **Ans. (a) Cereals** *[Ref. Park 23/e p626-627]*

220. **Ans. (c) Leucine** *[Ref. Park 23/e p628]*

221. **Ans. (b) Leucine** *[Ref. Park 23/e p627]*

222. **Ans. (a) Jaggery** *[Ref. K Park 20/e p576]*

223. **Ans. (c) Methionine** *[Ref. Park 23/e p628]*

FOOD ADULTERATION

224. **Ans. (c) Pyrrolizidine** *[Ref. Park 23/e p657]*

- Food Adulteration diseases:

Disease	Toxin	Adulterant
Lathyrism	BOAA	Khesari Dal (Lathyrus sativus)
Epidemic Dropsy	Sanguinarine	Argemone mexicana (oil)
Endemic Ascites	Pyrrolizidine alkaloids	Crotolaria seeds (Jhunjhunia)
Aflatoxicosis	Aflatoxin	Aspergillus flavus/parasiticus
Ergotism	Clavine alkaloids	Claviceps fusiformis

Also Remember

Lathyrism

- Lathyrism is of two types:
  - Neurolathyrism: In human beings
  - Osteolathyrism (Odoratism): In animals
- Neurolathyrism is caused by eating the pulse 'Khesari Dal (Lathyrus sativus)'. Diets containing over 30 % of this dal consumed over a period of 2 - 6 months result in neurolathyrism
- Toxin: present in lathyrus seeds is 'Beta oxalyl amino alanine (BOAA)
- Interventions for prevention and control of lathyrism:
  - Vitamin C prophylaxis
  - Banning the crop
  - Removal of toxin: Steeping method and Parboiling
  - Education
  - Genetic approach
  - Socio-economic changes

Epidemic Dropsy

- Is caused by contamination of mustard oil with 'Argemone oil'
- Toxin: 'Sanguinarine' is the toxin contained in argemone oil
- Sanguinarine interferes with oxidation of 'pyruvic acid', which accumulates in blood: It may lead to sudden non-inflammatory edema of bilateral lower limbs, diarrhea, dyspnoea, cardiac failure and death; It can also lead to glaucoma; It may sometimes manifest as 'Sarcoids' (dilatation of skin capillaries)
- Epidemic dropsy may occur in all ages except breast-fed infants.

Endemic Ascites:

- Toxin: Pyrrolizidine alkaloids (Hepatotoxins)
- Adulterant: Crotolaria plant (Jhunjhunia)

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225. Ans. (a) Sanguinarine *[Ref. Park 23/e p658]*

- Edema in Epidemic dropsy occurs due to proteinuria (specifically loss of albumin).
- Argemone oil may be detected by following tests:
  - Nitric acid test
  - Paper chromatography test: Most sensitive test

226. Ans. (b) Neurolathyrism *[Ref. Park 23/e p644, 657]*

- Neurolathyrism is caused by eating the pulse 'Khesari Dal (Lathyrus sativus)'; Diets containing over 30 % of this dal consumed over a period of 2 - 6 months result in neurolathyrism
- Toxin present in lathyrus seeds is 'Beta oxalyl amino alanine (BOAA)'

227. Ans. (c) Alanine *[Ref. Park 23/e p644, 657]*

228. Ans. (a) Bajra *[Ref. Park 23/e p657, 658]*

- *Ergotism:*
  - Occurs due to food toxicant - ergot fungus 'Claviceps fusiformis'
  - Food items having a tendency for ergotism:
    - Bajra
    - Rye
    - Sorghum
    - Wheat
  - Removal of ergot:
    - Float them in 20% salt water
    - Hand-picking
    - Air-floatation
  - Upper safe limit for ergot: 0.05 mg per 100 grams food material

229. Ans. (d) Khesari dhal *[Ref. Park 23/e p644, 657]*

230. Ans. All Choice *[Ref. Park 23/e p657]*

231. Ans. All Choices *[Ref. K. Park 23/e p658]*

232. Ans. (b) Claviceps purpurea *[Ref. K Park 23/e p657]*

233. Ans. (c) Jhunjhunia seeds *[Ref. K Park 23/e p658]*

234. Ans. (b) Nitric acid test *[Ref. K Park 23/e p658]*

235. Ans. (b) Paper chromatography *[Ref. K Park 23/e p658]*

Review Questions

236. Ans. (b) BOAA *[Ref. Park 23/e p644, 657]*

237. Ans. (b) BOAA *[Ref. Park 23/e p644, 657]*

238. Ans. (a) Pyrolizidine *[Ref. Park 23/e p658]*

239. Ans. (c) BOAA *[Ref. Park 23/e p657]*

240. Ans. (a) Parboiling *[Ref. Park 23/e p644]*

241. Ans. (a) Nitric acid test *[Ref. Park 23/e p658]*

MISCELLANEOUS

242. Ans. (b) RDA caters to dietary requirements of all people *[Ref. Nutrient Requirements and RDAs for Indians, ICMR; p4; Park 23/e p632]*

- RDA is often higher than the recommended minimum requirement: RDA includes both daily requirement and some additional requirement for periods of growth or illness.

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Also Remember

- RDA 'safe level approach' is not used for energy since excess energy intake is undesirable; for energy only mean or average requirement is defined as RDA

243. Ans. (b) The proportion of proteins, fats and carbohydrates is correct and in accordance with a balanced diet *[Ref. Park 23/e p637]*

- In 'Balanced Diet',
  - Proteins should constitute 10 - 15 % of total daily energy intake
  - Fats should constitute 15 - 30 % of total daily energy intake
  - Carbohydrates, rich in fibre, should constitute the remaining of energy

In the given question, a man weighing 68 kg, consumes 325 gm carbohydrate, 65 gm protein and 35 gms fat in his diet

	Energy (Kcal per gram)	Amount consumed (grams)	Energy consumed (Kcal)	% of total energy consumed
Carbohydrate	4	325	1300	68%
Fats	4.2	65	275	15%
Proteins	9.0	35	315	17%
Total				1890 Kcal

His total energy intake is 1890 Kcal
15% of his energy is derived from fats
Thus, the proportion of proteins, fats and carbohydrates is correct and in accordance with a balanced diet.

244. Ans. (d) PFA standards *[Ref. Park 23/e p660]*

- *Food Standards:*
  - Codex Alimentarius: Joint FAO/WHO standards for international markets; Food standards in India are based on Codex Alimentarius
  - PFA standards: Laid under 'Prevention of Food Adulteration Act 1954'; to obtain a minimum level of quality of food stuffs attainable under Indian conditions
  - Bureau of Indian Standards: Purely voluntary; express degree of excellence above PFA standards
  - Agmark standards: Purely voluntary; express degree of excellence above PFA standards

245. Ans. (c) 55kg *[Ref. Park 23/e p632]*

Also Remember

- Reference body weights of Infants (both male and female):
  - 0 - 6 months: 5.4 kg
  - 6 - 12 months: 8.4 kg

246. Ans. (d) None of the above *[Ref. Park 23/e p661]*

- *Mid-day meal programme (MDMP):* Also known as 'School Lunch Programme', it has been in operation since 1961
- *The major objective of MDMP:* To attract more children for admission to schools and retain them so that literacy improvement of children could be brought about.
- The meal is a supplement and not a substitute to the home diet
- The meal should supply 1/3 of the total energy requirement and 1/2 of the total protein requirement.

Also Remember

- MDMP is being operationalised under the Ministry of Education
- National Institute of Nutrition, Hyderabad is of the view that minimum number of feeding days in year be 250 to have the desired impact on children
- *Mid-day meal scheme (MDMS) (National Programme of Nutritional Support to Primary Education):* Launched in 1995 with the main objective universalisation of primary education by increasing enrolment, retention and attendance and simultaneously impacting on nutrition of students in primary classes
  - It aims at providing 450–700 calories and 12–20 gm proteins per day to all children class I to VIII.

247. Ans. (b) 1/2 proteins and 1/3rd calories *[Ref. Park 23/e p661]*

- The mid-day meal should supply 1/3 of the total energy requirement and 1/2 of the total protein requirement

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Item	Quantity per child per day	
	Primary	Upper primary
Food grains	100 grams	150 grams
Pulses	20 grams	30 grams
Vegetables	50 grams	75 grams
Oils & fats	5 grams	7.5 grams
Salt	As per need	As per need
TOTAL calories	450 Kcal	700 Kcal
TOTAL proteins	12 grams	20 grams

248. Ans. (a) A decrease in complex carbohydrate consumption *[Ref. Park 23/e p370]*

249. Ans. (c) 7 days *[Ref. Park 23/e p650]*

- Assessment of dietary intake (Diet Survey) can be carried out by 'Dietary Cycle', where 'weighment of raw foods is done over a period of 7 days'.

250. Ans. (d) Saffron colour in milk *[Ref. Park 23/e p659]*

- Food fortification: Is a public health, measure where nutrients are added to food (in relatively small quantities), to maintain/improve the quality of diet of a group, community or a population
- Examples of Food Fortification:
  - Iodisation of salt
  - Vitamin A and Vitamin D in Vanaspati
  - Fluoridation of water

Also Remember

- Food Fortification is an example of 'Primary Level of Prevention'
- Vanaspati is fortified with '2500 IU Vitamin A and 175 IU Vitamin D' per 100 grams.

251. Ans. (b) Defluoridation of water *[Ref. Park 23/e p644]*

- 'Nalgonda Technique' has been developed by National Environmental Engineering Research Institute (NEERI), Nagpur for defluoridation of water. It involves 'addition of lime, alum and bleaching powder' followed by flocculation, sedimentation and filteration. In Nalgonda technique, aluminium is major de-fluoridating agent.
- Household level de-fluoridation can be done by:
  - Nalgonda Technique
  - Alumina
  - Phosphates

252. Ans. (b) Mid arm Circumference *[Ref. Pediatric Clinic Methods by Meharban Singh, 2/e p59]*

- Shakir's Tape is a useful field instrument for measurement of nourishment status of a child, through measurement of Mid-arm-circumference (MAC)
- MAC is measured for age group 1 - 5 years (as it remains practically constant during this age)
- *Interpretation of Shakir's tape findings:*

MAC (cm)	Color Zone	Interpretation	Management
> 13.5	Green	Satisfactory nutritional status	–
12.5 - 13.5	Yellow	Mild-moderate malnutrition	At home; through diet
< 12.5	Red	Severe malnutrition	Refer; Institutional

Also Refer to Annexure 3.

Also Remember

- 'Bangle Test' (4 cm diameter) is also used for quick assessment of MAC
- 'Quac Stic' measures malnourishment by comparing MAC with height.

253. Ans. (d) Birth weight *[Ref. Pediatric Clinic Methods by Meharban Singh, 2/e p51]*

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- Bathroom weighing scale is unreliable instrument for measuring weight of children; For field conditions, Salter's Spring Scale is quite satisfactory as it is easy to carry.

254. Ans. (b) 30 *[Ref. Park 23/e p399]*

- *Body Mass Index (BMI)*: A simple index of weight-for-height that is commonly used to classify under-weight, over-weight and obesity in adults.
  - BMI is also known as 'Quetelet's Index'

$$BMI = \frac{Weight\ (Kg)}{Height^2\ (m^2)}$$

In the given question, weight = 89 kg and height = 172 cm,
Thus, BMI = 89/(1.72)2 = 30.08.

255. Ans. (a) Lathyrus *[Ref. Park 23/e p644]*

- Neurolathyrism is a crippling disease of nervous system, characterized by gradually developing spastic paralysis of lower limbs, occurring mostly in adults.

256. Ans. (b) Occurs with diet chiefly on maize *[Ref. K. Park 23/e p627]*

257. Ans. (c) Cereals are deficient in lysine and methionine is deficient in pulses *[Ref. Park 23/e p626, 628]*

258. Ans. (a) Policy maker; (b) Nutritional survey *[Ref. Park 23/e p650-651]*

- *Nutritional surveillance:* Keeping a watch over nutrition, in order to make decisions that will lead to improvement in nutrition of population
  - *Main strategy*: Detection of malnutrition (nutritional survey)
  - *Approach*: Diagnostic-interventional
  - *Sample*: Representative, 50 - 100 size group
  - *Objectives*:
    1. To aid health and development
    2. To provide input for program management and evaluation (to policy makers)
    3. To give timely warning and intervention (to prevent short-term food crises)

259. Ans. (c) Cranberry juice *[Ref. How Cranberry Juice can prevent Urinary Tract Infections, Science Daily, July 21, 2008]*

Cranberry Juice

- Mechanism for prevention of UTI: Proanthocyanidins in Cranberry juice prevent bacterial fimbriae from attaching to wall of urinary bladder and urinary tract.

260. Ans. (a) Meal should be a supplement only not a substitute for home diet; (c) Meal cost should be low; (d) Complicated cooking process must not be involved *[Ref. K. Park 23/e p661]*

Principles for Formulating Mid-Day Meals:

- Meal should be a supplement only not a substitute for home diet
- Meal should provide 1/3 calories and 1/2 proteins
- Meal cost should be low
- Complicated cooking process must not be involved
- Use locally available foods
- Keep changing menu frequently

261. Ans. (a) Weight for age *[Ref. WHO Malnutrition Document]*

262. Ans. (a) Egg *[Ref. K Park 23/e p630]*

263. Ans. (a) Age 18-29 yrs *[Ref. K Park 23/e p632]*

264. Ans. (b) Codex alimentarius standards *[Ref. Park 23/e p660]*

265. Ans. (d) Weight for height below 2SD of WHO Growth Standards 2006 *[Ref. Partha's Fundamental of Paediatrics, 2/e p69]*

WHO & UNICEF's Acute Malnutrition Criteria

- Presence of Bipedal edema
- Visible severe wasting
- Mid arm circumference below 115 mm
- Weight for height below 3SD of WHO Growth Standards 2006

266. Ans. (a) Codex alimentarius *[Ref. Park 23/e p660]*

267. Ans. (a) 1 only *[Ref. Food Processing and Preservation by Sivasankar, 1/e p246]*

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268. Ans. (d) 1, 2 and 3 *[Ref. The PFA Act 1954, p91]*

- *Food Preservatives:* Substances, which if added to food, are capable of inhibiting, retarding or arresting the process of fermentation, acidification or other decomposition of food

Class I preservatives	Class II preservatives
Common salt	Benzoic acid
Sugar, Dextrose, Glucose	Sulphuric acid
Spices	Sorbic acid, Lactic acid
Honey	Nicin
Vinegar, Acetic acid	Propionic acid

Review Questions

269. Ans. (a) Optimal protein supplementation is 1.5-2g/kg/day *[Ref. Park 23/e p638-641]*

270. Ans. (c) Height for age *[Ref. Park 23/e p640]*

271. Ans. (d) Percentage of pregnant lady with less than 11.5% haemoglobin *[Ref. Gupta & Mahajan 3/e p362; Park 23/e p648-650]*

272. Ans. (c); (d) 50,000 I.U at birth *[Ref. Park 23/e p615-616]*

273. Ans. (a) Fluorine *[Ref. Park 23/e p625]*

274. Ans. (a) Mid-arm circumference in 0-1 year age group *[Ref. Park 23/e p648-650]*

275. Ans. (a) Microorganisms *[Ref. Park 23/e p655]*

276. Ans. (c) Ragi *[Ref. Park 23/e p628]*

277. Ans. (a) Diet for dietary goal achievement *[Ref. Park 23/e p637]*

278. Ans. (c) AGMARK standard *[Ref. Park 23/e p660]*

279. Ans. (d) B12 deficiency *[Ref. Park 23/e p642]*

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CHAPTER

10

Social Sciences and Health

CONCEPTS IN SOCIOLOGY

Definitions in Sociology

- *Society*[Q]*:* Is a group of individuals who have organized themselves and follow a way of life
  - *Outstanding feature of society is a System*, a system of relationships between individuals
- *Community*[Q]: A social group determined by geographical boundaries and/or common values or interests
- *Sociology*[Q]: Study of individuals as well as groups in a society. It can be viewed as from 2 angles:
  - Study of relationships between human beings
  - Study of human behaviour
- *Socialisation*[Q]: Process by which an individual gradually acquires culture and becomes member of a social group
- *Social structure*[Q]: Patterns of inter-relationships between persons in a society
- *Medical sociology*[Q]*:* Includes studies of medical profession, of the relationship of medicine to public, and of the social factors in the aetiology, prevalence, incidence and interpretation of disease
- *Socialism*[Q]*:* Any economic doctrine that favours the use of property and resources of the country for public welfare
  - Based on social ownership for raising the living standard of working class
- *Social epidemiology:* When the objective of the research is to study the role of social factors in the etiology of the disease, epidemiological survey and social survey are merged together
- *Socialised medicine*[Q]*:* Provision of medical service and professional education by the State (as in state medicine), but the programme is operated and regulated by professional groups rather than by government
- *Social medicine:* Study of the social, economical, environmental, cultural, psychological and genetic factors, which have a bearing on health
- *Social defence:* Covers preventive, therapeutic and rehabilitative services for the protection of society from antisocial, criminal or deviant conduct of man

I

Social structure[Q]*:* Patterns of inter-relationships between persons in a society

I

Socialised medicine[Q]*:* Provision of medical service and professional education by the State (as in state medicine), but the programme is operated and regulated by professional groups rather than by government

Social and Behavioural Sciences

- *Social Sciences*[Q]*:* Comprises of those disciplines which are committed to the scientific examination of human behaviour; these are economics, political science, sociology, social psychology and social anthropology
- *'Behavioural Sciences'*[Q] is applied to last three, viz., sociology, social psychology and social anthropology, because they directly deal with human behaviour
  - *Economics:* Deals with human relationships in specific context of production, distribution, consumption and ownership of scarce resources, goods and services
  - *Political Science:* Study of systems of laws and institutions which constitute government of whole societies
  - *Sociology:* Study of human relationships and human behaviour for a better understanding of pattern of life
  - *Social psychology:* Concerned with psychology of individuals living in human society or groups
  - *Social anthropology:* Study of development and various types of social life

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I

Culture[Q]*:* Is the learned behaviour which is socially acquired
Acculturation[Q]*:* Is 'cultural contact' or mixing of two cultures. It can occur through

Anthropology

- Anthropology[Q]: Study of physical social and cultural history of man
  - *Physical (Biological) anthropology:* Study of human evolution, racial differences, inheritance of bodily traits, growth and decay
  - *Social anthropology:* Study of development and various types of social life
  - *Cultural anthropology:* Study of total way of life of contemporary primitive man, his ways of thinking, feelings and action
  - *Medical anthropology:* Deals with cultural component in ecology of health and disease
  - *Linguistic anthropology:* Seeks to understand the processes of human communications, verbal and non-verbal, including language

Social Pathology

- *Social Pathology*[Q]*:* Is the study of social problems which undermine the social, psychological or economical health of the populations; it is used to describe relationship between disease and social conditions
- *Social pathology is uncovered by 'Social Surveys'*
- *Social Problems studied under social pathology:*
  - *Social constraints:*
    - Poverty and destitution
    - Illiteracy and ignorance
    - Migration and environmental crisis
    - Industrialization and Urbanization
  - *Social evils:*
    - Smoking and drinking
    - Caste and casteism
    - Gender bias and gender discrimination
    - Child neglect and child abuse
    - Child labour and child abandonment
    - Stress and stress behaviour
    - Crime and corruption
    - Prostitution and STDs
  - *Social deviance:*
    - Drug abuse
    - Juvenile delinquency
    - Suicide

Culture and Acculturation

- *Culture*[Q]*:* Is the learned behaviour which is socially acquired
- *Acculturation*[Q]*:* Is 'cultural contact' or mixing of two cultures. It can occur through
  - Trade and commerce
  - Industrialization
  - Propagation of religion
  - Education
  - Conquest
- *Custom*[Q]*:* The established patterns of behavior that can be objectively verified within a particular social setting
  - *Folkways*[Q]*:* Right ways of doing things in less vital areas of human conduct
  - *Mores*[Q]*:* More stringent customs

Theories in Sociology

- *Feminist Theory:* Focuses on how gender inequality has shaped social life
  - Disease is due to social role of women enforced by men
- *Parsonian theory:* States that illness did not simply imply a 'biologically altered state, but also a socially altered state
  - Disease is due to social strain caused by social demands

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- *Marxist theory*. Is concerned with the relationship between health and illness and capitalist social organization
  - Cause of disease is putting profit ahead of health[Q]
- *Foucauldian Theory:* medical discourse plays an important role in the management of individual bodies (anantomopolitics) and bodies en masse (biopolitics)
  - Disease is labels to segregate population to make it easier to control

PSYCHOLOGY

Definitions and Concepts

- *Emotions:* Strong feelings of whole organism, which motivate human behaviour
- *Value:* The ideals, customs, institutions of a society toward which the people of the group have an affective regard
  - May be positive (cleanliness, freedom, or education) or negative (cruelty, crime, or blasphemy)
- *Opinions*[Q]*:* Views held by people on a point of dispute
  - Are 'temporary, provisional'[Q]
  - Is 'subjective in nature'[Q]
- *Belief* [Q]*:* Views derived from parents, grand parents and other people we respect
  - Are 'permanent, unstable, almost unchanging'[Q]
  - Is 'subjective in nature'[Q]
- *Attitude* [Q]*:* Relatively enduring organization of beliefs around an object or subject which predisposes one to respond in a preferential manner
  - Acquired characteristics of an individual
  - Is more or less 'permanent ways of behaving'[Q]
  - Is 'caught, not taught'
  - Is 'objective in nature'[Q]
- *Habits:* An accustomed way of doing things[Q]
  - Habits are acquired through repetitions, are automatic and can be performed only under similar circumstances

Opinions[Q]*:* Views held by people on a point of dispute
Are 'temporary, provisional'[Q]

Attitude[Q]*:* Is more or less 'permanent ways of behaving'

Emotions

- *Definition:* Strong feelings of whole organism, which motivate human behaviour [Q]
- *Types of emotions:*
  - *Fear:* MC emotion of man[Q]
  - *Phobia:* when fear becomes exaggerated or unnecessary
  - *Anger (Rage):* Reaction of offensive type; destructive in nature
  - *Anxiety:* may lead to tension or pain
  - *Love:* Feeling of attachment to some person

Fear: MC emotion of man[Q]

Learning

- *Definition:* Any relative permanent change in behaviour that occurs as a result of practice or experience
- *Conditions affecting learning:*
  - Intelligence
  - Age
  - Learning situation
  - Motivation
  - Physical health
- *Types of learning:*

Type of learning[Q]	Associations
Cognitive learning	Knowledge
Affective learning	Attitudes
Psychomotor learning	Skills

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I

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}} \times 100$$

Intelligence Quotient (IQ)

- *Intelligence Quotient (IQ):* Is a score derived from one of several different standardized tests attempting to measure intelligence
- *First intelligence tests were developed by:* Binet and Simon (1896)
- *Stern's IQ Test* Q*:* Originally IQ was calculated for children

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}} \times 100$$

- *Wechsler Adult Intelligence Scale (WAIS):* David Wechsler (1939) published the first intelligence test designed for an adult population; It was the *'first IQ test based on Normal/Gaussian distribution'* Q
- *Levels of Intelligence based on IQ levels*Q*:*

Levels of Intelligence	IQ range
Idiot	0 – 24
Imbecile a	25 – 49
Moron a	50 – 69
Borderline	70 – 79
Low normal	80 – 89
Normal a	90 – 109
Superior	110 – 119
Very superior	120 – 139
Near Genius a	140 and over

- *Categories of mental retardation based on IQ levels*Q*:*

Mental status	IQ range a
Normal IQ a	70 and over
Mild mental retardation	50 – 69
Moderate mental retardation	35 – 49
Severe mental retardation	21 – 34
Profound mental retardation	20 or below

FAMILY

Family Cycle

A normal *family cycle is conceived as having 6 phases*Q**:**

Phases of family life cycle		Events characterising	
No.	**Description**	**Beginning of phase**	**End of phase**
I	*Formation*	Marriage	Birth of 1st child
II	*Extension*	Birth of 1st child	Birth of last child
III	*Complete extension*	Birth of last child	1st child leaves home
IV	*Contraction*	1st child leaves home	Last child leaves home
V	*Completed contraction*	Last child leaves home	1st spouse dies
VI	*Dissolution*	1st spouse dies	Death of survivor (extinction)

Definitions and Concepts

- *Nuclear Family (Elementary/Unitary Family)*Q*:* Consists of a married couple and their children while they are still regarded as dependents
- *Joint Family* Q*:* Consists of no. of married couples and their children who live together in the same household
  - All males are related by blood while females are wives, daughters, sisters and widows

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- Property is held in common; there is a common family purse to which the all the family income goes and from which all the expenditures are met
- All authority is vested in the senior male member of the family
- Familial relations enjoys primacy over marital relations

- *3-Generation Family:* Consists of a household with representatives of three generations
- *Complex Family:* Is a generic term for any family structure involving more than two adults; term can refer to any extended family or to a polygamy of any type
- *Communal family*[Q]*:* Is a family where all of its members are playing a part in its management
  - *Is a good example of 'division of labour'*, an important function of a family.
- *Conjugal Family*[Q]*:* Is nuclear family of adult partners and their children (by birth or adoption) where the family relationship is principally focused inwardly and ties to extended kin are voluntary and based on emotional bonds, rather than strict duties and obligations; most common form is nuclear family
- *Broken Family*[Q]*:* Where both parents have separated or where death has occurred of one or both then parents
- *Problem Family*[Q]*:* Is a family which lags behind rest of the community; underlying factors in most problem families are those of personality, relationships, backwardness, poverty, illness, mental and social instability, character defects and marital disharmony
  - Standards of life are generally far below the accepted minimum
  - Parents are unable to meet the physical and emotional needs of children
  - Home life is utterly unsatisfactory
- *Dysfunctional Family:* Is a family in which conflict, misbehavior and even abuse on the part of individual members of the family occur continually, leading other members to accommodate such actions
- *Consanguineal Family:* Consists of a mother and her children, and other people — usually the family of the mother, like her husband
- *Matrifocal Family:* Consists of a mother and her children
- *New Family* [Q]*:* A family of less than 10 years duration and consists of parents and children
  - It is a variant of nuclear (elementary/unitary) family
  - New Family concept is important in view of studies related to family planning

I

Kuppuswamy Scale *based on*[Q]:
- Education status
- Occupation
- Income

SOCIO-ECONOMIC STATUS

Socio-economic Status (SES) Scales[Q]

Urban SES scales: Modified Kuppuswamy Scale[Q] Kulshreshtha Scale Srivastava Scale Jalota Scale	*Rural SES scales:* Udai Pareek Scale[Q] Modified B. G. Prasad Scale[Q] Radhukar Scale Shirpurkar Scale
Student's scale: Bhardwaj Scale	*Non-Indian SES scales*: Hollingshead (Occupation based) Scale Henderson Scale

Modified Kuppuswamy Scale

- Is used for Urban families
- *Is based on 3 parameters*[Q]*:*
  - Education status of head of family (Score 1 to 7)
  - Occupation of head of family (Score 1 to 10)
  - Income of the family per month (Score 1 to 12)
- *Scoring:* Each component is given a weighted score and summed up

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- *Socio-economic classes based on scores:*

Score	Socio-economic class
26 – 29	I. Upper
16 – 25	II. Upper - middle
11 – 15	III. Lower - middle
05 – 10	IV. Lipper - lower
< 05	V. Lower

(Minimum score 3; Maximum score 29)

Udai Pareek Scale

- Is for Rural families
- Is not dependent on income[Q]
- *Is based on 9 parameters:*
  - Caste
  - Occupation
  - Education
  - Land
  - Social participation
  - Family members
  - House
  - Farm power
  - Material possession
- *Scoring:* Each component is given a weighted score and summed up
- *Socio-economic classes based on scores:*

Score	Socio-economic class
> 43	I
33 – 42	II
24 – 32	III
13 – 23	IV
< 13	V

BG Prasad Scale

- Is for Rural families
- Is based on per capita monthly income
- *Socio-economic classes based on scores:*

Per capita monthly income (INR)		Socio-economic class
BG Prasad's Classification (1961)	Modified BG Prasad's Classification (1991) Proposed by Kumar	
≥ 100	≥ 1000	I
50 – 99	500 – 999	II
30 – 49	300 – 499	III
15 – 29	150 – 299	IV
< 15	< 150	V

ECONOMICS

Definitions

- *Gross National Income (GNI)/ Gross National Product (GNP)*[Q]*:* Is gross income generated from within the country as also net income received from abroad
- *Gross Domestic Product (GDP)*[Q]*:* Gross income generated within a country (excludes net income received)

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- *Net National Product (NNP):* GNP minus capital we consume
- *Net Domestic Product (NDP):* GDP minus value of depreciation on fixed assets
- *Purchasing Power Parity (PPP):* No. of units of a country's currency required to buy the same amount of goods and services in domestic market, as 1 dollar would buy in USA

I Rural areas poverty < 2400 Kcal per day

Below Poverty Line (BPL)

- *Below Poverty Line (BPL) Criteria*[Q]*:*

BPL Criteria	Rural areas	Urban areas
Per capita caloric intake	< 2400 Kcal per day	< 2100 Kcal per day
Per capita income (TC)	< 27/- INR per day	< 33/- INR per day
Per capita income (RC)	< 32/ - INR per day	< 47/- INR per day
Per capita income (WHO)	<1.25 US$ per day	

(TC: Tendulkar Committee 2011-12; RC: Rangarajan Committee 2014)

- *Below Poverty Line (BPL) population in India*[Q]:
  - 22% (Tendulkar Committee 2011-12)
  - 29.5% (Rangarajan Committee 2014)

Social Security and Social Safety Net

- *Social security*[Q]*:* primarily refers to a social insurance program providing social protection, or protection against socially recognized conditions, including poverty, old age, disability, unemployment and others
  - *Bismarck introduced a system of social insurance in Germany in 1883* [Q]*:* It became a model for other European countries to introduce similar social security systems
- *Approaches to social security system:*
  - *Social assistance*[Q]*:* Non-contributory benefit extended to vulnerable groups
  - *Social insurance*[Q]*:* Contributory benefit extended to individuals as a matter of right
- *Social Security measures for Industrial workers*[Q]*:*
  - Workmen's Compensation Act 1923
  - The Factory's Act 1948
  - Employees State Insurance Act 1948 (including Disablement Benefit)
  - Central Maternity Benefit Act 1961
  - The Family Pension Scheme 1971
- *Social safety net*[Q]*:* is a term used to describe a collection of services provided by the state, such as welfare, unemployment benefit, universal healthcare, homeless shelters, the minimum wage and sometimes subsidized services such as public transport, which prevent individuals from falling into poverty beyond a certain level

I Urban areas poverty < 2100 Kcal per day

INTERVIEWING

Interview

- *Interview:* A technique for investigation and an instrument for research
- *Types of Interview:*
  - *Direct (structured) Interview:* Pre-determined questions are asked
  - *Non directive (unstructured) Interview:* Collection of information by free discussion; no pre-determined questions
  - *Focussed Interview:* Focussing attention on a particular aspect of a problem
  - *Repetitive Interview:* To note the gradual influence of some social or psychological process

Steps of Interview

- *Establishing contact:* First requisite before conducting an interview[Q]
- Starting an interview

I *Establishing contact:* First requisite before conducting an interview

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I

Family is the *'most powerful example of social cohesion'*

- Securing rapport
- Recall
- Probe questions
- Encouragement
- Guiding the interview
- Closing the interview
- Report

MISCELLANEOUS

Group Dynamics

- *Family*[Q]*:* Is a group of biologically related individuals living together and eating from a common kitchen
  - Family is the primary unit of all societies
  - Family is the *'most powerful example of social cohesion'*[Q]
- *Crowd*[Q]*:* A group of people coming together temporarily for a short period, motivated by a common interest or curiosity
  - Crowd lacks internal organization and leadership[Q]
- *Mob*[Q]*:* A group of people coming together temporarily for a short period, having a leader who forces members into action
  - Mob is more emotional than crowd[Q]
  - Like crowd, mob is unstable and lacks internal organization
- *Herd* [Q]*:* Is a crowd with a leader, where members of the group have to follow the orders of the leader without question
- *Band:* Most elementary community of a few families living together
  - Group has organized itself and follows a pattern of life
- *Village:* A small collection of people permanently settled down in a locality with their homes and cultural equipments
- *Towns and Cities:* A relatively large, dense and permanent settlement of socially heterogeneous individuals
  - Community is subdivided into smaller groups on the basis of wealth and social class
- *State:* An ecological social group based on territory
  - State is more stabilised and formalized
  - State is heterogeneous in nature
  - Indian Union is a large state

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MULTIPLE CHOICE QUESTIONS

CONCEPTS IN SOCIOLOGY

1. **Pattern of interrelationships between persons in a society is known as:** *[AIIMS June 1997]* *[AIPGME 1997]*
   (a) Socialism
   (b) Socialization
   (c) Social structure
   (d) Medical sociology

2. **'Learned behaviour which is socially acquired' is known as:** *[AIIMS Dec 1992, May 2000]* *[Recent Question 2012]*
   (a) Customs
   (b) Acculturation
   (c) Standard of living
   (d) Culture

3. **The systematic study of human disease and social factors is known as:** *[AIIMS May 2001]*
   (a) Social physiology
   (b) Social pathology
   (c) Socialised medicine
   (d) Social medicine

4. **All of the following social sciences deal directly with human behaviour *except*:** *[AIPGME 1993]*
   (a) Political Science
   (b) Anthropology
   (c) Social Psychology
   (d) Sociology

5. **Relationship between the disease and social conditions is described by:** *[AIPGME 1993]*
   (a) Socialism
   (b) Acculturation
   (c) Social Pathology
   (d) Social Defence

6. **Putting profit ahead of health as a cause of disease is provided by which theory of sociology:**
   (a) Feminist *[AIIMS May 2009]*
   (b) Parsonian
   (c) Marxist
   (d) Foucauldian

7. **Acculturation may take place by:** *[Karnataka 2011]*
   (a) Education
   (b) Industrialization
   (c) Trade and commerce
   (d) All of the above

8. **Social pathology is:** *[AIIMS PGMEE May 2013]*
   (a) Change in disease pattern due to change in lifestyle
   (b) Study of social problems which cause disease in population
   (c) Conflicts arising from new opportunities in transitional societies
   (d) Study of human relationships and behaviour

9. **Sociology:** *[Recent Question 2013]*
   (a) Study of human relationship
   (b) Study of human behaviour
   (c) Both
   (d) None

10. **Study of physical, social and cultural history of man is known as:** *[Recent Question 2012]* *[Recent Question 2013]*
    (a) Social science
    (b) Anthropology
    (c) Acculturation
    (d) Sociology

11. **An organized group of people with social relationship:**
    (a) Community *[Recent Question 2013]*
    (b) Association
    (c) Society
    (d) Family

12. **Acculturation is:** *[DNB June 2009]*
    (a) Triage
    (b) Cultural change due to socialization
    (c) Attitude
    (d) Belief

Review Questions

13. **Acculturation means:** *[MP 2003] [DNB 2004]* *[Recent Question 2012]*
    (a) Culture contact
    (b) Study of the various cultures
    (c) Cultural history of health and disease
    (d) Exchange of Ideas

14. **Society is a:** *[AP 2003]*
    (a) System of relations between individuals
    (b) Group with same beliefs
    (c) Group with different beliefs
    (d) Group with different religions

15. **When there is contact between two people with different types of culture, there is diffusion of culture both ways which is called:** *[AP 2008]*
    (a) Socialization
    (b) Acculturation
    (c) Adjustment
    (d) All of the above

16. **A Child's weight for height is more than 2SD of mean, and his height for age is less than 2SD of mean. He is classified as:** *[MP 2000]*
    (a) Normal
    (b) Stunted

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(c) Wasted
(d) Wasted and stunted

17. Tendency of some members of a group to identify and interact with selected members only, leads to formation of a subgroup, this is called as: *[MH 2003]*
(a) Cohesion
(b) Sociometry
(c) Group structure
(d) Group dynamics

18. Which of the following is an example of primary social relationship? *[MH 2003]*
(a) Husband and wife
(b) Author and publisher
(c) Both
(d) None

19. Change in the affective level after communication and health education means change in: *[MH 2006]*
(a) Knowledge
(b) Attitude
(c) Skills
(d) All

20. The behavioral Science used extensively in PSM is:
(a) Anthropology *[RJ 2006]*
(b) Economics
(c) Politics
(d) Law

PSYCHOLOGY

21. Phobia is exaggerated or unnecessary form of:
(a) Fear *[AIPGME 1995]*
(b) Anger
(c) Anxiety
(d) Love

22. Match the following types of learning:

Type of learning	Associations
I. Cognitive learning	A. Skills
II. Affective learning	B. Knowledge
III. Psychomotor learning	C. Attitudes

(a) I – B, II – A, III – C *[AIPGME 1999]*
(b) I – B, II – C, III – A
(c) I – A, II – C, III – B
(d) I – A, II – B, III – C

23. Most important epidemiological tool used for assessing disability in children is: *[AIPGME 2003]*
(a) Activities of Daily living (ADL) scale
(b) Wing's Handicaps, Behavior and Skills (HBS) Schedule
(c) Binet and Simon IQ tests
(d) Physical Quality of Life Index (PQLI)

24. Inner subjective thought of a person towards an individual or a situation is best described as:
(a) Attitude *[AIIMS May 2009]*
(b) Value
(c) Belief
(d) Opinion

25. A temporary, provisional view held by people on a point of debate is: *[AIIMS May 2009]*
(a) Opinion
(b) Practice
(c) Attitude
(d) Belief

26. Learned behaviour which is permanent and consistent, but liable to change is: *[AIIMS Nov 2009]*
(a) Cultural belief
(b) Attitude
(c) Knowledge
(d) Practice

27. According to Maslow's hierarchy of needs, following is at the top of pyramid: *[NUPGET 2013]*
(a) Physical needs
(b) Self actualization
(c) Safety
(d) Esteem recognition

28. Social psychology is: *[Recent Question 2013]*
(a) Human relationships & behaviour
(b) Psychology of individuals in society
(c) Cultural history of man
(d) None

Review Questions

29. Not a method of learning: *[DNB 2001]*
(a) Propaganda
(b) Writing
(c) Group discussion
(d) Reading

30. A primitive man, feeling, thinking deals with:
(a) Social psychology *[UP 2003]*
(b) Sociometry
(c) Sociopathy
(d) Sociotherapy

IQ

31. 'Moron' is one with an IQ of: *[AIIMS Nov 2003]*
(a) 0-24
(b) 25-49
(c) 50-69
(d) 70-79

32. A person with an IQ of 55 is: *[AIPGME 1995]*
(a) Mild mental retardation
(b) Moderate mental retardation
(c) Severe mental retardation
(d) Profound mental retardation

33. Severe mental retardation is defined as: *[DPG 2011]*
(a) Intelligence quotient 50–70 *[UP 2003]*
(b) Intelligence quotient 35–49 *[MH 2000]*
(c) Intelligence quotient 20–34
(d) Intelligence quotient < 20

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34. IQ = 51 is: *[Recent Question 2013]*
(a) Mild MR
(b) Moderate MR
(c) Severe MR
(d) Profound MR

35. Average Mental IQ according to Wechsler's Scale is:
(a) 70-79 *[AIIMS PGMEE May 2013]*
(b) 80-89
(c) 90-109
(d) 110-119

36. Mild mental retardation does not include IQ level(s):
(a) 45 *[PGI May 2012]*
(b) 55
(c) 65
(d) 75
(e) 85

37. IQ is calculated by: *[Recent Question 2013]*
(a) Mental age/ chronological age X 100
(b) Mental age – chronological age X 100
(c) Chronological age/ mental age X 100
(d) Chronological age – mental age X 100

38. For mental retardation, IQ = 20-34 is:
(a) Severe MR *[Recent Question 2013]*
(b) Profound MR
(c) Moderate MR
(d) Mild MR

39. Chronological age 10 yrs, mental age 4yrs. What that person called as? *[Recent Question 2012]*
(a) Idiot
(b) Imbecile
(c) Normal
(d) Genius

Review Questions

40. Mild mental retardation is an IQ of:
(a) 50 – 70 *[Bihar 2003]*
(b) 30 – 40
(c) 70 – 80
(d) Below 25

41. IQ = 35 - 49; classified according to WHO is:
(a) Mild mental retardation *[WB 2008, UP 2005]*
(b) Moderate mental retardation *[RJ 2009]*
(c) Severe mental retardation
(d) Profound mental retardation

FAMILY

42. Arrange the following stages of family cycle in chronological sequence: *[AIIMS Dec 1991] [Recent Question 2013]*
(a) Formation, Extension, Complete extension, Dissolution, Contraction, Complete contraction
(b) Formation, Extension, Contraction, Complete extension, Complete contraction, Dissolution
(c) Formation, Contraction, Complete contraction, Extension, Complete extension, Dissolution
(d) Formation, Extension, Complete extension, Contraction, Complete contraction, Dissolution

43. A family where all of its members are playing a part in its management is known as: *[AIIMS May 2006]*
(a) Elementary family
(b) New family
(c) 3-Generation family
(d) Communal family

44. Family, which lags behind rest of the community, is known as: *[AIIMS Nov 2003]*
(a) Communal family
(b) Elementary family
(c) Problem family
(d) Broken family

45. The following is true about the term 'New Families': *[AIIMS May 2003]*
(a) It is a variant of the 3-generation family
(b) It is applied to all nuclear families of less then 10 years duration
(c) It is a variant of the joint family
(d) It is applied to all nuclear families of less then 2 years duration

46. Nuclear family consists of: *[Recent Question 2012]*
(a) Husband, wife and son
(b) Husband, wife and dependent children
(c) Husband and wife only
(d) Father mother husband and wife

47. …….. is a bridge between generations, and a transfer point of civilization *[Recent Question 2015]*
(a) School
(b) Orphanage
(c) Family
(d) Recreational club

SOCIO- ECONOMIC STATUS

48. Kuppuswamy Scale for socio-economic status is based on *[DNS 2011] [AIPGME 1994, AIIMS Nov 1999]*
(a) Income of the family, No. of livestock, No. of acres of farm land *[MH 2000]*
(b) Income of the family, No. of members in the family, Education of head of family
(c) No. of vehicles in family, Occupation of head of family, Education of head of family
(d) Income, Occupation of head of family, Education of head of family

49. The socio-economic/Housing scale developed for rural setup is: *[DNB December 2009]*
(a) Pareek
(b) Kuppuswamy
(c) Bhore
(d) Adson's scale

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50. **Upper class score in Kuppuswamy Socio-economic status scale is:** *[Recent Question 2014]*
    (a) 5-10
    (b) 11-15
    (c) 16-25
    (d) 26-29

Review Question

51. **Socioeconomic status in urban areas is indicated by which of the following?** *[AP 2006]*
    (a) Kuppuswamy scale
    (b) Sullivan index
    (c) Human development index
    (d) Physical quality of life index

SOCIAL PROBLEMS

52. **The Children's Act was passed in:** *[AIIMS May 2000]*
    (a) 1960
    (b) 1969
    (c) 1971
    (d) 1986

53. **Which of the following is best suited for the role of social worker?** *[AIIMS PGMEE May 2012]*
    (a) Health professional involved in physiotherapy
    (b) Health professional involved in coping strategies, interpersonal skills, adjustment with family
    (c) A person involved in finding jobs and economic support for disabled
    (d) Health professional involved in treatment of patients

54. **Which of the following statement(s) is/are true about Women empowerment?** *[PGI May 2013]*
    (a) Power over resources
    (b) Involvement in Political decision making
    (c) Involvement in economic decision making
    (d) Improved standard of living
    (e) Increased life expectancy

55. **The 'Nirbhaya Fund' set up by the Government of India is for** *[UPSC CMS 2015]*
    (a) Ensuring the safety of women
    (b) Promoting the financial literacy of rural poor
    (c) Promoting Self-Help Groups of women
    (d) Providing free education

Review Questions

56. **Estimated number of children affected by trafficking every year is:** *[MP 2009]*
    (a) 1.2 million
    (b) 2.4 million
    (c) 3.6 million
    (d) 4.8 million

ECONOMICS

57. **Income generated within a country is known as:**
    (a) Gross Domestic Product (GDP) *[AIIMS May 2001]*
    (b) Net National Product (NNP)
    (c) Net Domestic Product (NDP)
    (d) Purchasing Power Parity (PPP)

58. **Poverty Line can be defined in terms of:**
    (a) Daily fat intake *[AIIMS Nov 1993]*
    (b) Daily protein intake
    (c) Daily calorie intake
    (d) Access to health services

59. **Social insurance was introduced by:** *[AIPGME 2005]*
    (a) Martin Luther King
    (b) Bismarck
    (c) Dr. Watson
    (d) Baba Amte

60. **Poverty line is defined as expenditure required for daily calorie consumption below:** *[DPG 2007]*
    (a) 1800
    (b) 2000
    (c) 2100
    (d) 2200

61. **Government (public) expenditure on health as percentage of GDP is:** *[AIIMS PGMEE November 2013]*
    (a) 1.2
    (b) 12
    (c) 5
    (d) 0.12

62. **Current percent of Indian GDP on health is:** *[AIIMS PGMEE November 2012]*
    (a) 1.2
    (b) 2
    (c) 10
    (d) 15

Review Questions

63. **The percentage of GNP to expand in total health and family development is:** *[UP 2005]*
    (a) 3%
    (b) 5%
    (c) 6%
    (d) 7%

64. **In "poverty lines" the expenditure required for a daily calorie intake of ———in rural areas:** *[UP 2008]*
    (a) 2200
    (b) 2400
    (c) 2100
    (d) 2300

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INTERVIEWING

65. First requisite before conducting an interview is:
(a) Securing rapport *[AIIMS June 1998]*
(b) Probe questions
(c) Establishing contact
(d) Guiding the interview

66. In interview, first stage is to: *[DNB December 2011]*
(a) Establish contact
(b) Starting interview
(c) Establishing rapport
(d) Probe questions

MISCELLANEOUS

67. Most powerful example of social cohesion is:
(a) Mob *[AIIMS Jan 1992]*
(b) Hospital
(c) Family
(d) Herd

68. Socio-security measures that are provided to the workers by which of the following Act/Acts:
(a) Factory Act *[PGI Dec 03]*
(b) Central Maternity Benefit Act
(c) Workman Compensation Act
(d) Disablement Benefit Act
(e) Pensioners Act

69. Increased Drug Compliance can be seen with:
(a) Frequent dosing
(b) Longer Duration of Treatment
(c) Multiple drugs
(d) Involving family Members in Observation

70. An unstable and emotional temporary social group with a leader is known as: *[Karnataka 2011]*
(a) A band
(b) A crowd
(c) A herd
(d) A mob

71. Study of designing equipment and devices that fit the human body, its movements, and its cognitive abilities is: *[DNB December 2009]*
(a) Economics
(b) Ergonomics
(c) Bionomics
(d) Socionomics

Review Question

72. All are included in 'High social safety net' *except*:
(a) High birth rate *[Kolkata 2002]*
(b) High MMR
(c) Reduction in institutional delivery
(d) High lMR

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EXPLANATIONS

CONCEPTS IN SOCIOLOGY

1. **Ans. (c) Social structure** *[Ref. Park 23/e p671]*
   - *Social structure*: Patterns of inter-relationships between persons in a society
   - *Socialism*: Is economic doctrine that favours the use of property and resources of the country for public welfare; it is a system of production and distribution based on social ownership
   - *Socialization*: Process by which an individual gradually acquires culture and becomes member of a social group
   - *Medical sociology*: Includes studies of medical profession, of the relationship of medicine to public, and of the social factors in the aetiology, prevalence, incidence and interpretation of disease
   - *Society*: Is a group of individuals who have organized themselves and follow a way of life
     - *Outstanding feature of society is a System*, a system of relationships between individuals
   - *Community*: A social group determined by geographical boundaries and/or common values or interests
   - *Sociology*: Study of individuals as well as groups in a society. It can be viewed as from 2 angles:
     - Study of relationships between human beings
     - Study of human behaviour

Also Remember

- *Sociology*: Study of human relationships and human behaviour for a better understanding of pattern of life

2. **Ans. (d) Culture** *[Ref. Park 23/e p672]*
   - *Culture*: Is the learned behaviour which is socially acquired
   - *Acculturation*: Is 'cultural contact' or mixing of two cultures. It can occur through
     - Trade and commerce
     - Industrialization
     - Propagation of religion
     - Education
     - Conquest
   - *Custom*: The established patterns of behavior that can be objectively verified within a particular social setting
     - *Folkways:* Right ways of doing things in less vital areas of human conduct
     - *Mores:* More stringent customs
   - *Standard of Living:* Refers to the usual scale of our expenditure, goods we consume and services we enjoy. Standard of living (WHO) includes
     - Income and Occupation,
     - Standards of housing, sanitation and nutrition,
     - Level of provision of health, educational, recreational and other services.

Also Remember

- *'Taboos are the most extreme form of mores'* as they forbid a society's most outrageous practices, such as incest and murder
- Standard of living depends on *'Per capita GNP'*

3. **Ans. (b) Social pathology** *[Ref. Park 23/e p673]*

   SOCIAL PATHOLOGY:
   - *Social Pathology*: Is the study of social problems which undermine the social, psychological or economical health of the populations; it is used to describe relationship between disease and social conditions
   - *Social pathology is uncovered by 'Social Surveys'*

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Also Remember

- *Social surveys* disclose social pathology.
  - *Social epidemiology*: When the objective of the research is to study the role of social factors in the etiology of the disease, epidemiological survey and social survey are merged together
- *Socialised medicine*: Provision of medical service and professional education by the State (as in state medicine), but the programme is operated and regulated by professional groups rather than by government
- *Social medicine*: Study of the social, economical, environmental, cultural, psychological and genetic factors, which have a bearing on health

4. **Ans. (a) Political Science** *[Ref. Park 23/e p670]*
   - *Social Sciences*: Comprises of those disciplines which are committed to the scientific examination of human behaviour; these are economics, political science, sociology, social psychology and social anthropology (*'Behavioural Sciences'* is applied to last three, viz., sociology, social psychology and social anthropology, because they directly deal with human behaviour)
     - *Economics*: Deals with human relationships in specific context of production, distribution, consumption and ownership of scarce resources, goods and services
     - *Political Science*: Study of systems of laws and institutions which constitute government of whole societies
     - *Sociology*: Study of human relationships and human behaviour for a better understanding of pattern of life
     - *Social psychology*: Concerned with psychology of individuals living in human society or groups
     - *Social anthropology*: Study of development and various types of social life
5. **Ans. (c) Social Pathology** *[Ref. Foundations of Community Medicine, GM Dhaar and I Robbani, 1/e p279-98 and Park 23/e p673]*

Also Remember

- *Social defence*: Covers preventive, therapeutic and rehabilitative services for the protection of society from antisocial, criminal or deviant conduct of man

6. **Ans. (c) Marxist** *[Ref. An Introduction to Sociology, health and Illness by Kevin white; p7]*

   THEORIES IN SOCIOLOGY
   1. *Feminist Theory:* Focuses on how gender inequality has shaped social life
      - Disease is due to social role of women enforced by men
   2. *Parsonian theory:* States that illness did not simply imply a 'biologically altered state, but also a socially altered state
      - Disease is due to social strain caused by social demaninds
   3. *Marxist theory.* Is concerned with the relationship between health and illness and capitalist social organization
      - Cause of disease is putting profit ahead of health
   4. *Foucauldian Theory:* medical discourse plays an important role in the management of individual bodies (anantomopolitics) and bodies en masse (biopolitics)
      - Diesease is labels to segregate population to make it easier to control
7. **Ans. (d) All of the above** *[Ref. K. Park 23/e p672]*
8. **Ans. (b) Study of social problems which cause disease in population** *[Ref. K Park 23/e p673]*
9. **Ans. (c) Both** *[Ref. K Park 23/e p670]*
10. **Ans. (b) Anthropology** *[Ref. K Park 23/e p670]*
11. **Ans. (c) Society** *[Ref. K Park 23/e p670]*
12. **Ans. (b) Cultural change due to socialization** *[Ref. K Park 23/e p672]*

Review Questions

13. **Ans. (a) Culture contact** *[Ref: Park 23/e p672]*
14. **Ans. (a) System of relations between individuals** *[Ref: Park 23/e p670]*
15. **Ans. (b) Acculturation** *[Ref: Park 23/e p672]*
16. **Ans. (b) Stunted** *[Ref: Park 23/e p640]*

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17. **Ans. (b) Sociometry** *[Ref: Internet]*
18. **Ans. (a) Husband and wife** *[Ref: Park 22/e p606]*
19. **Ans. (b) Attitude** *[Ref: Park 23/e p676]*
20. **Ans. (a) Anthropology** *[Ref: Park 23/e p670]*

PSYCHOLOGY

21. **Ans. (a) Fear** *[Ref. Park 23/e p675]*
EMOTIONS: Strong feelings of whole organism, which motivate human behaviour
- *Fear*: MC emotion of man
  - *Phobia*: when fear becomes exaggerated or unnecessary
- *Anger (Rage)*: Reaction of offensive type; destructive in nature
- *Anxiety*: may lead to tension or pain
- *Love*: Feeling of attachment to some person

Also Remember

- *Emotional Intelligence (EI)* measured as *Emotional quotient (EQ)*: describes an ability, capacity, skill or a self-perceived ability, to identify, assess, and manage the emotions
- *Alexithymia*: describe a state of deficiency in understanding, processing, or describing emotions

22. **Ans. (b) I – B, II – C, III – A** *[Ref. Park 23/e p676]*
LEARNING: Any relative permanent change in behaviour that occurs as a result of practice or experience
- *Types of learning*:

Type of learning	Associations
Cognitive learning	Knowledge
Affective learning	Attitudes
Psychomotor learning	Skills

23. **Ans. (b) Wing's Handicaps, Behavior and Skills (HBS) Schedule** *[Ref. Park 23/e p680]*
- *Wing's Handicaps, Behavior and Skills (HBS) Schedule*: One of the most important epidemiological tool used for assessing abilities and disabilities in children
  - *Wing's HBS in not useful for those who are not retarded*

MENTAL HEALTH RATING SCALES IN CHILDREN:
- *Adaptive Behaviour Scale (AAMR ABS)*: To evaluate functional and behavioural disorder in children and adolescents with mental retardation, autism and other developmental disabilities
- *Child Behaviour Checklist (CBCL) Scale*: To evaluate pathological behaviours and social competence in children aged 1½ to 18 years.
- *Children's Depression Inventory (CDI) Scale*: To evaluate depression in children and adolescents
- *Children's Depression Rating Scale (CDRS)*: To evaluate severity of depression in children
- *Comprehensive Behaviour Rating Scale for Children (CBRS(C)*: To assess child's school functioning
- *Conners' Rating Scale (CRS)*: To assess psychopathology and behavioural problems in children and adolescents
- *Diagnostic Interview Schedule for Children (DIS(C)*: To diagnose mental disorders in children and adolescents
- *Revised Children's Manifest Anxiety Scale (RCMAS)*: To evaluate anxiety in children
- *Reynolds Adolescent Depression Scale (RADS)*: To screen for and measure depression in adolescents

Also Remember

- *International Classification of Functioning, Disability and Health* (ICF) is a classification of the health components of functioning and disability
  - The ICF classification complements WHO's International Classification of Diseases-10th Revision (IC(D), which contains information on diagnosis and health condition, but not on functional status
  - The ICF is structured around the following broad components:
    1. Body functions and structure
    2. Activities (related to tasks and actions by an individual) and participation (involvement in a life situation)
    3. Additional information on severity and environmental factors

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24. Ans. (c) Belief *[Ref. Park 21/e p626, Park 22/e p628]*

- *Attitude*: Relatively enduring organization of beliefs around an object or subject which predisposes one to respond in a preferential manner
  - Acquired characteristics of an individual
  - Is more or less 'permanent ways of behaving'
  - Is 'caught, not taught'
  - Is 'objective in nature'
- *Value:* The ideals, customs, institutions of a society toward which the people of the group have an affective regard
  - May be positive (cleanliness, freedom, or education) or negative (cruelty, crime, or blasphemy)
- *Opinions:* Views held by people on a point of dispute
  - Are 'temporary, provisional'
  - Are 'Subjective in nature'
- *Belief:* Views derived from parents, grand parents and other people we respect
  - Are 'permanent, unstable, almost unchanging'
  - Is 'subjective in nature'

25. Ans. (a) Opinion *[Ref. Park 23/e p676]*

26. Ans. (a) Cultural belief *[Ref. Park 23/e p676]*

27. Ans. (b) Self actualization *[Ref. Textbook of Basic Nursing by Rosdahi and Kowaiski, 9/e p44-45]*

28. Ans. (b) Psychology of individuals in society *[Ref. K Park 23/e p670]*

Review Questions

29. Ans. (a) Propaganda *[Ref: Park 21/e p626-27, Park 22/e p628, 29]*

30. Ans. (a) Social psychology *[Ref: Park 23/e p670]*

IQ

31. Ans. (c) 50-69 *[Ref. Park 23/e p679]*

- *Levels of Intelligence based on IQ levels*:

Levels of Intelligence	IQ range
Idiot	0 – 24
Imbecile	25 – 49
Moron	50 – 69
Borderline	70 – 79
Low normal	80 – 89
Normal	90 – 109
Superior	110 – 119
Very superior	120 – 139
Near Genius	140 and over

- *Categories of mental retardation based on IQ levels*:

Mental status	IQ range
Normal IQ	70 and over
Mild mental retardation	50 – 69
Moderate mental retardation	35 – 49
Severe mental retardation	21 – 34
Profound mental retardation	20 or below

Also Remember

- *Sentience Quotient (SQ)*: Is a measure of the efficiency of an individual brain, not its relative intelligence
- *Emotional Intelligence Quotient (EQ)*: Describes an ability, capacity, or skill to perceive, assess, and manage the emotions of one's self, of others, and of groups
- *Social intelligence*: Is the ability to understand and manage men and women, boys and girls, to act wisely in human relations

32. Ans. (a) Mild mental retardation *[Ref. Park 23/e p679]*

33. Ans. (c) Intelligence quotient 20-34 *[Ref. K. Park 23/e p679]*

34. Ans. (a) Mild MR *[Ref. K Park 23/e p679]*

35. Ans. (c) 90-109 *[Ref. K Park 23/e p679]*

36. Ans. (a) 45; (d) 75; (e) 85 *[Ref. K Park 23/e p679]*

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37. **Ans. (a) Mental age/chronological age X 100** *[Ref. K Park 23/e p679]*

38. **Ans. (a) Severe MR** *[Ref. K Park 22/e p538]*

39. **Ans. (b) Imbecile** *[Ref. K Park 23/e p679]*

Review Question

40. **Ans. (a) 50 – 70** *[Ref. Park 23/e p679]*

41. **Ans. (b) Moderate mental retardation** *[Ref. Park 23/e p679]*

FAMILY

42. **Ans. (d) Formation, Extension, Complete extension, Contraction, Complete contraction, Dissolution** *[Ref. Park 23/e p682-683]*
    - A normal *family cycle is conceived as having 6 phases*:

Phases of family life cycle		Events characterising	
	Description	**Beginning of phase**	**End of phase**
I	*Formation*	Marriage	Birth of 1st child
II	*Extension*	Birth of 1st child	Birth of last child
III	*Complete extension*	Birth of last child	1st child leaves home
IV	*Contraction*	1st child leaves home	Last child leaves home
V	*Completed contraction*	Last child leaves home	1st spouse dies
VI	*Dissolution*	1st spouse dies	Death of survivor (extinction)

43. **Ans. (d) Communal family** *[Ref. Park 23/e p683]*
    - *Communal family*: Is a family where all of its members are playing a part in its management
      - *Is a good example of 'division of labour'*, an important function of a family.

Also Remember

- *Most powerful example of social cohesion*: Family

44. **Ans. (c) Problem family** *[Ref. Park 23/e p686]*
    - *Problem Family*: Is a family which lags behind rest of the community; underlying factors in most problem families are those of personality, relationships, backwardness, poverty, illness, mental and social instability, character defects and marital disharmony
      - Standards of life are generally far below the accepted minimum
      - Parents are unable to meet the physical and emotional needs of children
      - Home life is utterly unsatisfactory

Also Remember

- *Nuclear Family (Elementary/Unitary Family):* Consists of a married couple and their children while they are still regarded as dependents
- *Broken Family:* Where both parents have separated or where death has occurred of one or both the parents
- *Communal family:* Is a family where all of its members are playing a part in its management

45. **Ans. (b) It is applied to all nuclear families of less then 10 years duration** *[Ref. Park 21/e p633, Park 22/e p635]*
    - *New Family*: A family of less than 10 years duration and consists of parents and children
      - It is a variant of nuclear (elementary/unitary) family
      - New Family concept is important in view of studies related to family planning

46. **Ans. (b) Husband, wife and dependent children** *[Ref. K Park 23/e p683]*

47. **Ans. (c) Family** *[Ref. Sociology by Basu, 1/e p24]*
    - Goldenwiser speaks of family as a bridge between generations and between fathers and sons
    - It is a transfer point of civilization

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SOCIO-ECONOMIC STATUS

48. Ans. (d) Income, Occupation of head of family, Education of head of family *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p17, Park 23/e p689]*

- *Modified Kuppuswamy Scale*: For socioeconomic status
  - Is used for Urban families
  - *Is based on 3 parameters*:
    1. Education status of head of family
    2. Occupation of head of family
    3. Income of the family per month
  - *Scoring*: Each component is given a weighted score and summed up
  - *Socio-economic classes based on scores*:

Score	Socio-economic class
26 – 29	I
16 – 25	II
11 – 15	III
05 – 10	IV
< 05	V

- *Udai Pareek Scale*:
  - Is for Rural families
  - *Is not dependent on income*

Also Remember

- *Socio-economic status (SES) scales*:

– *Urban SES scales*: 1. Modified Kuppuswamy Scale 2. Kulshreshtha Scale 3. Srivastava Scale 4. Jalota Scale	– *Rural SES scales:* 1. Udai Pareek Scale 2. Modified B. G. Prasad Scale 3. Radhukar Scale 4. Shirpurkar Scale
– *Student's scale*: 1. Bhardwaj Scale	– *Non-Indian SES scales*: 1. Hollingshead (Occupation base(d) Scale 2. Henderson Scale

49. Ans. (a) Pareek *[Ref. K Park 23/e p689]*

50. Ans. (d) 26-29 *[Ref. Park 23/e p689-690]*

Socioeconomic classes under Modified Kuppuswamy Scale

Socioeconomic class	Total score
Upper	26-29
Upper middle	16-25
Lower middle	11-15
Upper lower	05-10
Lower	01-04

Review Question

51. Ans. (a) Kuppuswamy scale *[Ref. Park 23/e p689-690]*

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SOCIAL PROBLEMS

52. Ans. (a) 1960 *[Ref. Park 23/e p697]*

IMPORTANT ACTS IN PUBLIC HEALTH: (Related to child health)	Year
The Vaccination Act	1880
The Child Marriage Restraint (SARD(A) Act	1929
The Children's Act	1960
The Registration of Births and Deaths Act	1969
The Infant Milk Substitutes, Feeding Bottles and Infant Food *(Regulation of production, supply and distribution) Act*	1992
The Pre-conception and Pre-natal Diagnostic Techniques *(Prohibition of Sex Selection) [PNDT] Act*	1994

53. Ans. (b) Health professional involved in coping strategies, interpersonal skills, adjustment with family *[Ref. Logical Reasoning]*

54. Ans. (b) Involvement in Political decision making; (c) Involvement in economic decision making *[Ref. Women Empowerment Through Literacy Campaign by J Varghese, 1/e p120-21]*

55. Ans. (a) Ensuring the safety of women *[Ref. Current Affairs 2015, p107]*

- Nirbhaya Fund is an Indian rupee 30 billion corpus (over first 2 years) announced by Government of India in February 2013
- This fund is expected to support initiatives by the government and NGOs working towards protecting the dignity and ensuring safety of women in India
- Nodal Ministry: Ministry of Women and Child Development

Review Question

56. Ans. (a) 1.2 million *[Ref. Park 21/e p541, Park 22/e p543]*

ECONOMICS

57. Ans. (a) Gross Domestic Product (GDP) *[Ref. Park 23/e p700]*

- *Gross National Income (GNI)/ Gross National Product (GNP)*: Is gross income generated from within the country as also net income received from abroad
- *Gross Domestic Product (GDP)*: Gross income generated within a country (excludes net income received)
- *Net National Product (NNP)*: GNP *minus* capital we consume
- *Net Domestic Product (NDP)*: GDP *minus* value of depreciation on fixed assets
- *Purchasing Power Parity (PPP)*: No. of units of a country's currency required to buy the same amount of goods and services in domestic market, as 1 dollar would buy in USA

Also Remember

- *India's per capita GNP (2010)*: US $ 1070
- *Gross Domestic Product, GDP* = consumption + gross investment + government spending + (exports - imports)

58. Ans. (c) Daily calorie intake *[Ref. Park 23/e p702]*

- *Below Poverty Line (BPL) Criteria* [Q]:

BPL Criteria	Rural areas	Urban areas
Per capita caloric intake	< 2400 Kcal per day	< 2100 Kcal per day
Per capita income (TC)	< 27/- INR per day	< 33/- INR per day
Per capita income (RC)	< 32/- INR per day	< 47/- INR per day
Per capita income (WHO)	<1.25 US$ per day	

(TC: Tendulkar Committee 2011-12; RC: Rangarajan Committee 2014)

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- *Below Poverty Line (BPL) population in India*[Q]:
  - 22% (Tendulkar Committee 2011-12)
  - 29.5% (Rangarajan Committee 2014)

Also Remember

- *World Bank definition of poverty*:
  - Extreme poverty as living on less than US$ (PPP) 1 per day
  - Moderate poverty as living on less than $2 a day
- *'Eradication of extreme poverty and hunger by 2015'* is the first Millennium Development Goal (MDG)
- *Diseases of poverty*: Diseases that are more prevalent among 'the poor' than among wealthier people
  - *3 primary diseases of poverty*: AIDS, malaria, and tuberculosis
  - *3 additional diseases of poverty*: measles, pneumonia and diarrheal diseases
- *Gini coefficient*: A measure of statistical dispersion most prominently used as a measure of inequality of income distribution or inequality of wealth distribution
- *Human Poverty Index (HPI)*: Is an indication of the standard of living in a country, developed by the United Nations
  - HDI is a measure of development, whereas HPI is a measure of its deprivation

59. Ans. (b) Bismarck *[Ref. Foundations of Community Medicine, GM Dhaar and I Robbani, 1/e p25]*

- *Social security*: primarily refers to a social insurance program providing social protection, or protection against socially recognized conditions, including poverty, old age, disability, unemployment and others
- *Approaches to social security system*:
  - *Social assistance*: Non-contributory benefit extended to vulnerable groups
  - *Social insurance*: Contributory benefit extended to individuals as a matter of right
- *Bismarck* introduced a system of social insurance in Germany in 1883: It became a model for other European countries to introduce similar social security systems

Also Remember

- *Social safety net*: is a term used to describe a collection of services provided by the state, such as welfare, unemployment benefit, universal healthcare, homeless shelters, the minimum wage and sometimes subsidized services such as public transport, which prevent individuals from falling into poverty beyond a certain level

60. Ans. (c) 2100 *[Ref. Park 23/e p702]*

61. Ans. (c) 5 *[Ref. Annual Report 2013-14, MoHFW, Government of India]*

Current India's public health expenditure on health is 3.9% of GDP [2012]

62. Ans. (a) 1.2 [RECENT VALUE Public health core expenditure is 1.04% of GDP; Total health expenditure is 4.1% of GDP] *[Ref. XIIth FYP document, Volume 3, Health, p2-3]*

Review Questions

63. Ans. (b) 5% *[Ref. K. Park 20/e p776]*

64. Ans. (b) 2400 *[Ref. Park 23/e p702]*

INTERVIEWING

65. Ans. (c) Establishing contact *[Ref. Park 23/e p695]*

- *Steps of Interview*:
  - Establishing contact: first requisite before conducting an interview
  - Starting an interview
  - Securing rapport
  - Recall
  - Probe questions
  - Encouragement
  - Guiding the interview
  - Closing the interview
  - Report

66. Ans. (a) Establish contact *[Ref. K Park 22/e p695]*

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MISCELLANEOUS

67. Ans. (c) Family *[Ref. Park 23/e p681-682]*

- *Family*: Is a group of biologically related individuals living together and eating from a common kitchen
  - Family is the primary unit of all societies
  - Family is the *'most powerful example of social cohesion'*
- *Crowd*: A group of people coming together temporarily for a short period, motivated by a common interest or curiosity
  - Crowd lacks internal organization and leadership
- *Mob*: A group of people coming together temporarily for a short period, having a leader who forces members into action
  - Mob is more emotional than crowd
  - Like crowd, mob is unstable and lacks internal organization
- *Herd*: Is a crowd with a leader, where members of the group have to follow the orders of the leader without question

Also Remember

- *Types of families on basis of authorities vested*:
  - *Patriarchal*: Male member head of the family has the authority in decision making and controlling the family affairs; female is a subordinate
  - *Matriarchal*: Authority is vested in the female head of the family
- *Household*: All members of the household may not be related by blood
  - The number of households in a house is determined by *'according to the no. of kitchens'* (chulahs) in a house
- *City*: When population exceeds 100, 000
  - There are 7935 towns in India (Census 2011)
- There are 6,40,867 villages in India

68. Ans. ALL CHOICES *[Ref. Park 23/e p698]*

- *Social Security measures for Industrial workers*:
  - Workmen's Compensation Act 1923
  - The Factory's Act 1948
  - Employees State Insurance Act 1948 (including Disablement Benefit)
  - Central Maternity Benefit Act 1961
  - The Family Pension Scheme 1971

69. Ans. (d) Involving family members in observation *[Ref. Park 21/e p634, Park 22/e p636]*
In DOTS (RNTCP), several studies have shown improved compliance of treatment when family members are involved in observation

70. Ans. (d) A mob *[Ref. K. Park 23/e p682]*

71. Ans. (b) Ergonomics *[Ref. K Park 23/e p803]*

Review Question

72. Ans. (c) Reduction in institutional delivery *[Ref. Internet]*

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CHAPTER

11 Environment and Health

WATER

Safe and Wholesome Water

- *Safe and wholesome water*[Q]: Has been defined as water that is
  - Free from pathogenic agents
  - Free from harmful chemical substances
  - Pleasant to taste (free from colour and odour)
  - Usable for domestic purposes
- Water is said to be *'polluted'* or *'contaminated'* if it does not fulfill above criteria.

> I
> Rain:
> Is the *'purest form of water in nature'*

Sources of Water

- *Rain*:
  - Is the prime source of all water[Q]
  - Is the *'purest form of water in nature'*[Q]
  - *Chemically, it is very soft water*: contains traces (0.0005%) of solids
  - Gibraltar depends on rain water as a source of supply
- *Surface water*:
  - Impounding reservoirs
    - Artificial lakes for storing large quantities
    - Mumbai, Chennai, Nagpur derive water from it
    - Next to rain water in purity
  - Rivers and streams
    - Grossly polluted; unfit for drinking without treatment
    - Delhi, Kolkata, Allahabad derive water from it
  - Tanks, ponds and lakes
- *Ground water*:
  - Shallow wells
    - Moderately hard, grossly contaminated water
    - Taps water from above 1st impervious layer[Q]
  - Deep wells
    - Much hard, pure water; constant supply
    - Taps water from below 1st impervious layer[Q]
  - Springs.

Criteria for identification of 'Problem Habitations'

- *Not Covered (NC)/ No Safe Source (NSS) Habitations*[Q]:
  - Drinking water source point is not within 1.6 km in plains or 100 m elevation in hilly areas
  - Water source affected with quality problems like excess salinity, iron, fluoride, arsenic, or other toxic materials or biologically contaminated
  - Quantum of availability of safe water is not enough to meet drinking and cooking needs
- *Partially Covered (PC) Habitations*:
  - Drinking water source point is within 1.6 km in plains or 100 m elevation in hilly areas
  - Capacity of system is 10 – 40 lpcd
- *Fully Covered (FC) Habitations*: include all the remaining habitations.

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Purification of Water

- *Purification of water on a large scale*:
  - *Storage of water*:
    - Physical
    - Chemical
    - Biological
  - *Filtration of water*:
    - Slow sand (Biological) filters
    - Rapid sand (Mechanical) filters
  - *Disinfection of water*:
    - Chlorination
    - Ozonation
    - Ultraviolet irradiation
- *Purification of water on a small scale*:
  - *Household purification of water*:
    - Boiling
    - Chemical disinfection: Bleaching powder, Chlorine solution, High test hypochlorite (HTH), Chlorine (Halozone) tablets, Iodine, Potassium permanganate
    - Filtration: Ceramic filters (Pasteur Chamberland filter, Berkefeld filter, Katadyn filter)
  - *Disinfection of wells*:
    - Chemical: Bleaching powder (Double pot method).

Comparison of Rapid and Slow Sand Filters[Q]

	Rapid Sand Filter	Slow Sand Filter
Space	Occupies very little space	Occupies large area
Rate of filtration	200 m.g.a.d.	2 – 3 m.g.a.d.
Effective size of sand[Q]	0.4 – 0.7 mm	0.2 – 0.3 mm
Preliminary treatment	Coagulation, sedimentation	Plain sedimentation
Washing[Q]	By back-washing	By scraping sand bed
Frequent washing[Q]	Required	Not required
Mechanism of action	Essentially physical	Both physical & mechanical
Operation	Highly skilled	Less skilled
Loss of head allowed[Q]	6 – 8 feet	4 feet
Removal of turbidity	Good	Good
Removal of colour	Good	Fair
Removal of bacteria[Q]	98 – 99 percent	99.9 – 99.99 percent
Suitability	For big cities	For small towns

Key Guideline Aspects of WHO recommended Drinking Water Quality

- *Colour* < 15 true colour units (TCU) [Q]
- *Turbidity* < 1 nephlometric turbidity units (NTU) [Q]
- *Hardness* < 100 – 300 mg/litre calcium ion
- *pH*: 6.5 – 8.5
- *Total dissolved solids* (*TDS*) < 1000 mg/litre[Q]
- Zero pathogenic microorganisms
- Zero infectious viruses
- *Absence of pathogenic protozoa and infective stages of helminthes*
- *Fluorine* < 1.5 ppm (0.5 – 0.8 ppm: Optimum level)

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I
Nitrates < 50 mg/litre[Q]

- *Nitrates* < 50 mg/litre[Q]
- *Nitrites* < 3 mg/litre[Q]
- *Gross alpha radiological activity* < 0.5 Bq/litre [New Guideline – WHO][Q]
- *Gross beta radiological activity* < 1.0 Bq/litre [New Guideline – WHO][Q]

Chlorination of Water

I
Nitrites < 3 mg/litre[Q]

- *Disinfecting action of chlorine in water is due to*:
  - Hypochlorous acid (HOCl) – Main role in disinfection[Q]
  - Hypochlorite ions (OCl) – Minor role in disinfection
- *Chlorine has residual germicidal effect* (and not Ozone or UV rays): Provides a margin of safety against subsequent microbial contamination, as may occur during storage and distribution
- *Phases of Chlorination*:
  - *Phase I*: Formation of chloramines
  - *Phase II*: Destruction of chloramines
  - *Phase III*: Appearance of break-point
  - *Phase IV*: Accumulation of free residual chlorine.

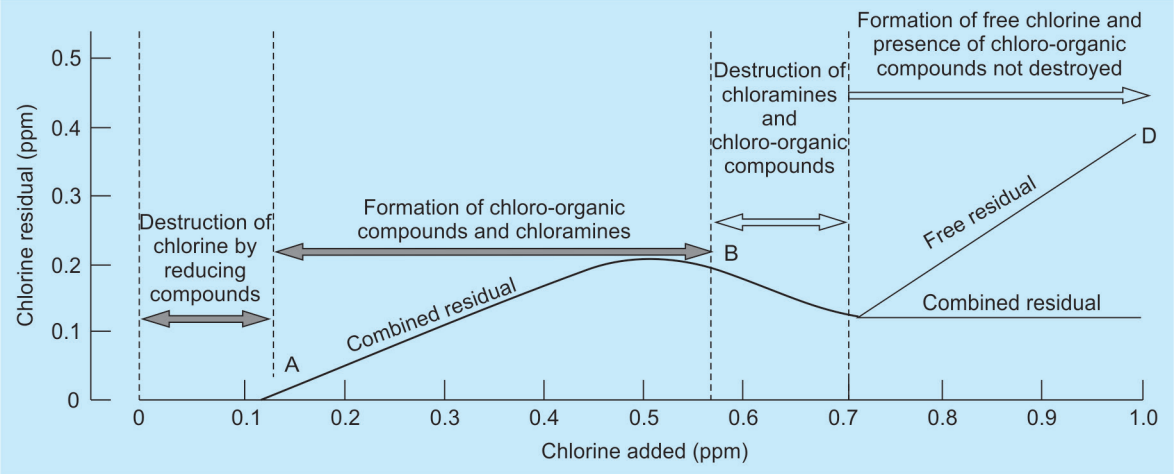

Figure: Phases of chlorination

- *Recommended contact period of free residual chlorine in water*: 1 hour[Q]
- *Level of free residual chlorine (FRC) recommended*:

Water type	Recommended	
	Residual chlorine level*	Contact period
Drinking water[Q]	> 0.5 mg per litre (ppm)	1 hour
Water bodies, post disaster	> 0.7 mg per litre (ppm)	1 hour
Swimming pool sanitation[Q]	> 1.0 mg per litre (ppm)	1 hour

(*1 mg per litre = 1 ppm)

- *Instruments used in chlorination of water*:

Instrument	Utility
Horrock's Apparatus[Q]	Chlorine demand estimation
Chlorinator/ Chloronome	Mixing or regulating dose of chlorine
Chloroscope[Q]	Measuring residual level of chlorine

- *Tests for chlorination of water*:
  - *Ortho-toulidine (OT) Test*[Q]: Measure the levels of,
    - Free (residual) chlorine
    - Free & Combined chlorine
  - *Ortho-toulidine Arsenite (OTA) Test*[Q]: Measure the levels of,
    - Free chlorine
    - Combined chlorine

I
Disinfecting action of chlorine in water is due to:
Hypochlorous acid (HOCl)

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- *OTA test is better than OT test as*[Q]:
  - Detects both free and combined chlorine separately
  - Not affected by interfering substances (nitrites, iron, manganese).

I Horrock's Apparatus *'Chlorine demand estimation of water'*

Horrock's Apparatus

- *Use*: To find out the dose of bleaching powder required for disinfection of water, i.e. *'Chlorine demand estimation of water'*[Q]
- *Contents*:
  - 6 white cups (200 ml capacity each)
  - 1 Black cup (with a circular mark inside)
  - 2 metal spoons
  - 7 glass stirring rods
- *Indicator: Starch iodide* (producing blue colour)[Q]
  - Dose of bleaching powder required (Chlorine demand): n × 2 gms to disinfect 455 litres of water (where n = no. of first cup which shows distinct blue colour)[Q]
  - Development of blue colour indicates: presence of free residual chlorine.

Hardness of Water

- Hardness of water is defined as the *'soap destroying power of water'*[Q]
- Hardness of water is of two types:

Type of Hardness	Underlying causes[Q]
Temporary hardness (Carbonate hardness)	Calcium & Magnesium salts of Bicarbonates
Permanent hardness (Non- Carbonate hardness)	Calcium & Magnesium salts of Sulfates Calcium & Magnesium salts of Chlorides Calcium & Magnesium salts of Nitrates

I *Softening of water is recommended at level of hardness > 3 meq/ litre*

- *Hardness of water is expressed in terms of*: milliequivalents per litre (meq/litre) of CALCIUM CARBONATE ($CaCO_3$)[Q]
  - 1 meq/litre hardness = 50 mg $CaCO_3$ (50 ppm) per litre of water[Q]
- *Classification of hardness in water*:

Classification	Level of Hardness (mq/litre)
Soft water	< 1 (< 50 mg/l)
Moderately Hard water	1 – 3 (50 – 150 mg/l)
Hard water	3 – 6 (150 – 300 mg/l)
Very Hard water	> 6 (> 300 mg/l)

  - *Softening of water is recommended at level of hardness > 3 meq/ litre* (>150mg/ litre of Calcium carbonate)[Q]
- *Methods of removal of hardness of water*:

Type of hardness	Methods of removal[Q]
Temporary hardness	Boiling Addition of lime Addition of sodium carbonate Permutit process
Permanent hardness	Addition of sodium carbonate Base exchange process

Bacteriological Indicators of Water Quality[Q]

- *Coliform organisms*:
  - *Primary & most reliable bacterial indicator for water quality*[Q]
  - E. coli is most important coliform indicator[Q]
  - Reasons for choosing coliforms as indicators of fecal pollution Rather Than Water Borne Pathogens[Q]:

Coliform organisms: Primary & most reliable bacterial indicator for water quality

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Fecal streptococci: Indicate '*recent contamination of water*'Q
Clostridium perfringens: Indicate '*remote contamination of water*'Q

  - Constant presence in great abundance in human intestine; foreign to potable waters
  - Easily detectable by culture methods
  - Longer survival period
  - Greater resistance to forces of natural purification
- *Fecal streptococci*:
  - Indicate '*recent contamination of water*'Q
- *Clostridium perfringens*:
  - Indicate '*remote contamination of water*'Q

Presumptive Coliform Test

- *MPN Multiple Tube test*: Is based on estimating the most probable number (MPN) of coliform organisms in 100 ml of waterQ
  - *Culture medium*: McConkey's Lactose Bile Salt brothQ
  - *Indicator*: Bromocresol purpleQ
  - *Presumption*: Tubes showing fermentation (acid & gas) contain coliforms
  - *Method*: 4 tubes inoculated with 0.1, 1.0, 10, 50 ml of water & incubated for 48 hrs
  - *Confirmatory tests* (*EIKJMAN'S Tests*Q): Subculture each presumptive positive tube in 2 tubes of brilliant green bile broth.
    - Incubate one tube at 37 °C × 48 hrs: confirmation of presence of coliforms
    - Incubate second tube at 44° C × 6 – 24 hrs: confirmation of presence of E.coli
  - *True MPN Index*: Calculate revised MPN from McCrady's tablesQ
- *Membrane Filtration Technique*:
  - *Membrane*: cellulose ester
  - *Method*: pass known volume of water through membrane, inoculate membrane on suitable media, count colonies in 20 hrs.

Public Health Classification of Water Borne Diseases

- *Water borne diseases*: Occur due to drinking contaminated water, transmitted by faeco-oral route
  - Examples: Typhoid, Cholera, Dysentery, Viral Hepatitis A
- *Water washed diseases*Q: Include infections of the outer body surface which occur due to inadequate use of water or improper hygiene
  - Examples: Scabies, Trachoma, Typhus, Bacillary dysentery, Amoebic dysentery
- *Water based diseases*Q: Refers to infections transmitted through an aquatic invertebrate animal
  - Examples: Schistosomiasis, Dracunculiasis (Guineaworm disease)
- *Water related diseases* (*Water breeding diseases*): Are infections spread by insects that depend on water
  - Examples: Malaria, Filariasis, Dengue, Yellow fever, Onchocerciasis

AIR

Ventilation

- *Types of ventilation*:
  - *Natural ventilation*:
    - *Wind*: It blows through a room (*Perflation*) and may exert a suction at its tail end (*Aspiration*)
    - *Diffusion*: When passes through smallest openings
    - Inequality of temperature.
  - *Mechanical* (*artificial*) *ventilation*:
    - *Exhaust ventilation*: Air is extracted to outside by exhaust fans driven by electricity

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- *Plenum ventilation*Q: Fresh air is blown into rooms by centrifugal fans
- *Balanced ventilation*: Combination of exhaust and plenum ventilation
- *Air conditioning*: Simultaneous control of all factors especially temperature, humidity and air movement

I *Air change*Q: 2 – 3 changes per hour in living rooms

- *Standards of Ventilation*:
  - *Cubic space*: Fresh air supply of 3000 cu. ft. per hour per person
  - *Air change*Q: 2 – 3 changes per hour in living rooms; 4 – 6 changes per hour in work rooms and assemblies
  - *Floor space*: Minimum 50-100 sq. ft. per personQ

Air Humidity

- *Description*: Air humidity is moisture content of air
- *Air humidity can be measured by*Q:
  - Dry and wet bulb thermometers
  - Hygrometer
  - Sling/Whirling Psychrometer
  - Assman Psychrometer.

Air Pollution

- *Primary pollutants*: are emitted directly (SO_2, NO_2, CO, Hydrocarbons, Particulate matter, CFCs, Ammonia, Radioactive materials, Metals like lead, cadmium, copper)
- *Secondary pollutants*: are formed by interaction between primary pollutants (Ground level ozone, Peroxyacetyl nitrate, Particulate matter formed from primary pollutants)
- *Chemical indicators of air pollution*Q:
  - *Sulphur dioxide*: BEST INDICATOR of air pollutionQ
  - *Smoke or Soiling index*: Air strain on a filter paper measured through photoelectric meter
  - *Grit & dust measurement*
  - *Coefficient of haze*
  - *Air pollution index*
  - *Soiling Index*Q
- *BEST Biological indicator of air pollution*: LichensQ

I *Sulphur dioxide:* BEST INDICATOR of air pollution

Sources of Indoor Air Pollution

Indoor air pollutant	Sources
Respirable particles	Tobacco smoke, Stove, Aerosols
Carbon monoxide	Combustion equipment, Stove, Gas heaters
Nitrogen dioxide	Gas cookers, Cigarettes
Sulphur dioxide	Coal combustion
Carbon dioxide	Combustion, Respiration
Formaldehyde	Particle board, Carpet adhesives, Insulation
Organic vapours (benzene, toulidine)	Solvents, Adhesives, Resins, Aerosols
Ozone	Electric arcing, UV light
Radon & daughters	Building materialsQ
Asbestos	Insulation, Fire-proofing
Mineral fibres	Appliances

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tolerable sound level to human ear
85-90 dB[Q]

Instruments used in Air Temperature[Q]

Instrument	Measures[Q]
Dry bulb thermometer	Air temperature
Wet bulb thermometer	Air temperature
Maximum thermometer	Air temperature
Minimum thermometer	Air temperature
Six's maximum & minimum thermometer	Air temperature
Silvered thermometer	Air temperature
Globe thermometer	Mean radiant temperature
Wet Globe thermometer	Environmental heat
Kata thermometer	Cooling power of Air; Low air velocity

Global Warming

- *Greenhouse gases*[Q]:
  - Water vapour (Highest contribution)
  - Carbondioxide (Second highest contribution)
  - Methane
  - Ozone
    - *Ozone layer*: Is beneficial as it cuts down UV transmission
    - CFCs depletes ozone layer.
- *Kyoto Protocol*[Q]:
  - *Entered into force*: 16th Feb 2005
  - *Signed and ratified by*: 187 countries
  - *Targeted reductions in transmissions*[Q]:
    - Carbondioxide
    - Methane
    - Nitrous oxide
    - Sulphurhexafluoride (SF6)
    - Perfluorocarbons (PFC)
    - Chlorofluorocarbons (CFC).

SOUND

Sound Levels

- *Human ear is sensitive to sound frequency*: 20 – 20,000 Hz[Q]
- *Daily maximum tolerable sound level to human ear* (without substantial damage to their hearing): 85-90 dB[Q]
- *Auditory fatigue appears in*: 90 dB region (greatest at 4000 Hz) [Q]
- *Sound level above which tympanic membrane rupture* (permanent mechanical damage): 150-160 dB[Q].

Noise Levels

- *Whisper*: 20-30 dB
- *Normal conversation*: 60-70 dB
- *Mechanical damage*: 150-160 dB (e.g Jet taking off).

Acceptable Noise Levels

Environment	Place	Acceptable noise level dB (A)
Residential	Bed room Living room	25 40

Contd...

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Contd...

Commercial	Office Conference Restaurants	35 – 45 40 – 45 40 – 60
Industrial	Workshop Laboratory	40 – 60 40 – 50
Educational	Class room Library	30 – 40 35 – 40
Hospitals[Q]	Wards	20 – 35

I Hospitals[Q]
Wards noise levels:
20 – 35 dB

LIGHT

Illumination

- *Basic minimum illumination for satisfactory vision*: 15 – 20 foot candles[Q]
- *Reflection factors for efficient vision*:
  - Ceilings and roofs: 80%
  - Walls: 50 – 60%
  - Floor: 15 – 20%
  - Furniture: 30 – 40%
- *Daylight factor (D.F.)*[Q]: Measures intensity of daylight illumination
  - *Recommended D.F. for living rooms*: ≥ 8%
  - *Recommended D.F. for kitchens*: ≥ 10%.

HOUSING

Housing Standards in India

I *Floor area:* 50-100 sq. ft. per person

- *Site*: Elevated from surroundings; away from nuisances; subsoil water below 10 feet
- *Set back*: Built up area upto 2/3 of total area
- *Floor*: Ppucca; height of plinth 2 – 3 feet
- *Walls*: 9 – inch brick wall plastered; low heat capacity
- *Roof*: > 10 feet in absence of air-conditioning; low heat transmittance coefficient
- *Rooms*: should be depending on family size
- *Floor area:* 50-100 sq. ft. per person[Q]
- *Cubic space*: > 500 cu. ft. per capita
- *Windows*: Windows area 1/5 of floor area (Doors + windows area 2/5 of floor area[Q]); placed at height of not more than 3 ft from floor
- *Lighting*: Day light factor > 1% over half of floor area[Q]
- *Kitchen*: Separate; impervious floor; adequately lighted; provided with water supply and drainage
- *Privy*: Sanitary privy in each house
- *Garbage and refuse*: Sanitary disposal method
- *Bathing and washing*: Exclusive facilities
- *Water supply*: Safe and adequate water supply.

Rural Housing Standards in India

- Minimum 2 living rooms
- Ample verandah space
- Built up area up to 1/3 of total area
- Separate kitchen with paved sink/platform
- Sanitary latrine
- Windows area 10% of floor area
- Sanitary well/tube well within ¼ mile

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- Cattle shed > 25 ft away
- Adequate arrangement for disposal of waste water, refuse and garbage

I *Sanitary Landfill (Controlled Tipping): [Most Satisfactory Method[Q] For solid waste disposal]*

WASTE DISPOSAL

Types of Wastes

- *Refuse*: Solid waste generated
  - Street refuse
  - Market refuse
  - Stable refuse
  - Industrial refuse
  - Constructional refuse
  - Hospital refuse
  - Domestic refuse
    - *Ash*: Residue from fire used for cooking & heating
    - *Rubbish*: Paper, clothing, wood, metal, glass, dust
    - *Garbage*: Processed food waste generated from kitchen[Q]
- *Sewage*: Liquid waste containing excreta[Q]
- *Sullage*: Liquid waste without excreta[Q]
- *Litter*: Waste disposed in wrong place by unlawful human action.

I *Composition of sewage[Q]: 99.9% water + 0.1% solids*

Methods of Refuse Disposal

Methods of refuse disposal	
Insanitary methods[Q]	**Sanitary methods[Q]**
Hog feeding Stacking Salvaging Dumping	Composting Sanitary landfill Incineration

- *Hog feeding*: Traditional way of refuse disposal by feeding to pigs
  - Insanitary method: Leads to soil pollution & water pollution
- *Stacking*: Piling up of refuse & cow dung
- *Salvaging*: Screening refuse dumps to recover objects that can be reclaimed & reused
- *Dumping*: Throwing refuse openly in an insanitary manner in periurban areas
- *Composting*: Integrated method of disposal of refuse & night soil
  - *Bangalore method[Q]* (*Anaerobic hot fermentation process[Q]*): Alternate layers of refuse & night soil in proportion 3:1, with refuse layer both as lowermost as well as topmost
  - *Indore Method* (*Aerobic process*)
- *Sanitary Landfill* (*Controlled Tipping*): Laying of dry & condensed refuse in layers with intervening earth partitions & coverings, followed by mechanical compression *[Most Satisfactory Method[Q]]*
  - Trench Method
  - Ramp Method
  - Area Method
- *Incineration*: High temperature dry oxidation process which reduces waste volume & weight[Q].

Sewage

- *Sewage*: Is waste water from a community, containing solid and liquid excreta, derived from houses, street and yard washings, factories and industries
- *Composition of sewage[Q]*: 99.9% water + 0.1% solids (organic & inorganic).

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- *Amount of sewage that flows in sewers depends upon*:
  - Habits of people
  - Time of day
- *Dry weather flow*: Is the average amount of sewage that flows in sewerage system in 24 hours[Q]
- *Strength of sewage is expressed in terms of*[Q]:
  - *Biological Oxygen Demand* (*BOD*[Q]): Is defined as 'amount of oxygen absorbed by a sample of sewage' during a specified period (Generally 5 days), at a specified temperature (generally 20°C) for aerobic destruction or use of organic matter by living organisms
    - BOD is most important test done on sewage (done through Dilution method and Manometric method)
    - Strong Sewage has BOD > 300 g/litre and Weak Sewage has BOD < 100 g/litre[Q]
  - *Chemical Oxygen Demand* (*COD*): Measures oxygen equivalent of that portion of organic matter in a sample, which is susceptible to oxidation by a strong chemical oxidizer
    - Potassium dichromate is best for COD estimation.
  - *Suspended solids*: Amount in domestic sewage varies from 100 – 500 mg/litre
    - Strong Sewage has suspended solids amount > 500 mg/litre and Weak Sewage has suspended solids amount < 100 mg/litre.

I Strong Sewage has BOD > 300 g/litre

Methods of Sewage Disposal

- *Modern sewage treatment*:
  - Primary treatment:
    - Screening
    - Grit chamber
    - Primary sedimentation
  - Secondary treatment:
    - Aerobic oxidation (Trickling filter method; Activated sludge process)
    - Secondary sedimentation
    - Sludge digestion.
- *Sea outfall*
- *River outfall*
- *Land treatment* (*sewage farming/ broad irrigation*)
- *Oxidation ponds* (*waste stabilization pond/ redox pond/ sewage lagoons*[Q]): Predominantly organic during day and some part of night; only bottom layers have anaerobic digestion
- *Oxidation ditches*

Methods of Excreta Disposal in Unsewered Areas

- *Service type latrines* (*Conservancy system*):
  - Pail type latrine
  - Bucket type latrine
- *Non – service type latrines* (*Sanitary latrines*):
  - Bore hole latrine
  - Dug well or pit latrine
  - Water seal type latrines
    - P.R.A.I. type
    - R.C.A. type
    - Sulabh shauchalaya
  - Septic tank
  - Aqua privy

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Ideal retention period in Septic tank: 24 hours

- *Latrines suitable for camps and temporary use*[Q]:
  - Shallow trench latrine
  - Deep trench latrine
  - Pit latrine
  - Bore hole latrine

Septic Tank

- *Description*: Is a water-tight masonary tank into which household sewage is admitted for treatment
  - Is a satisfactory method of disposing liquid and excreta wastes from individual dwellings, small groups of houses or institutions which have *'adequate water supply but do not have access to a public sewerage system'*
- *Design features of a septic tank*:
  - *Capacity*: Minimum should be 500 gallons
  - *Length*: to be twice the breadth
  - *Depth*: 1.5-2 m
  - *Liquid depth*: 1.2 m
  - *Air space depth*: 30 cm
  - *Ideal retention period*: 24 hours[Q]
- *Steps of purification in a septic tank*[Q]:
  - *Anaerobic digestion*: takes place in septic tank proper
  - *Aerobic oxidation*: takes place in sub-soil (outside septic tank)
- *Process of purification in a septic tank*:
  - Solids settle down in tank to form *'Sludge'* whereas lighter solids (including grease and fat) rise to surface to form *'Scum'*: Solids undergo anaerobic digestion; methane is formed
  - Liquid which passes out of outlet pipe is called *'Effluent'* (containing bacteriae, cysts, helminthic ova and organic matter) which is allowed to percolate in sub-soil: undergoes aerobic digestion by bacteria
- *Operation and maintenance of a septic tank*:
  - Avoid soap water and disinfectants (phenol) as they are injurious to bacterial flora
  - 'Desludging' should be carried out once a year
  - New tanks to be filled with water and seeded with ripe sludge from another septic tank (to provide right kind of bacteria).

MISCELLANEOUS (ENVIRONMENT)

Sanitation Measures for Swimming Pool Sanitation

- *Recommended area*: Recommended area is minimum 2.2 sq. metre (24 sq. ft.) per swimmer[Q]
- *Surveillance*: Rules and regulations to be posted in appropriate place
- *Filtration of water*: Water to be refiltered in less than 6 hours (rapid sand filters); 15% water to be replaced by fresh water everyday[Q]
- *Chlorination of water*: Residual level of free chlorine to be > 1.0 ppm to protect against bacterial and viral agents[Q]
- *pH of water*: 7.4-7.8
- *Bacteriological quality of water*: To be as close to standards prescribed for drinking water.

Radiation

- *Sources of radiation exposure*:
  - *Natural sources*: (total exposure is 0.1 rad per person per year[Q])
    - Cosmic rays[Q]

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- Environmental
- Internal

– *Man-made sources*:
- X-rays[Q]
- Radioactive fall-out

• *Types of radiation*:
– *Electromagnetic*:
- X-rays
- Gamma rays

– *Corpuscular*:
- Alpha particles
- Beta particles
- Protons

• *Biological effects of Radiation exposure*:
– *Somatic effects*:
- Immediate
  1. Radiation sickness
  2. Acute radiation syndrome
- Delayed
  1. Leukaemia
  2. Carcinogenesis
  3. Foetal anomalies
  4. Shortening of life

– *Genetic effects*:
- Chromosomal mutations
- Point mutations.

ENTOMOLOGY AND VECTOR CONTROL

Biological Transmission of Arthropod-borne Diseases

Transmission	Definition	Examples[Q]
Propagative[Q]	Disease agent only multiplies in the body of vector	Plague bacilli in rat fleas Yellow fever virus in Aedes mosquitoes
Cyclo-propagative[Q]	Disease agent undergoes cyclical change and multiplies in the body of vector	Malarial parasite in anopheline mosquitoes
Cyclo-developmental[Q]	Disease agent undergoes only cyclical change in the body of vector	Filarial parasite in culex mosquitoes Guineaworm embryo in cyclops

Vectors and Diseases Transmitted

Vector	Disease(s) transmitted[Q]
Housefly (Musca domestica)[Q]	Diarrhoeal & dysentrical diseases, Poliomyelitis, Yaws, Anthrax, Trachoma
Sandfly (Phlebotamus argentipes)[Q]	Kala azar (Visceral Leishmaniasis), Oriental sore (Cutaneous Leishmaniasis), Sandfly fever, Oroya fever
Tse-Tse fly (Glossina palpalis)[Q]	Sleeping sickness of Africa (African Trypanosomiasis)
Reduviid bug (Triatominae)[Q]	Chagas Disease (Sleeping sickness of America- American Trypanosomiasis)
Black fly (Simulum)[Q]	Onchocerciasis (River Blindness)
Soft tick[Q]	Relapsing fever, Q fever, KFD (outside India)
Hard tick	Tularemia, Babesiosis, KFD (India), Tick paralysis, Tick encephalitis, Tick hemorrhagic fever, Indian Tick Typhus, RMSF
Louse[Q]	Epidemic typhus, Trench fever, Relapsing fever

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Life span of a mosquito varies from: 8-34 days

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Mite	Scrub typhus, Rickettsial pox
Flea[Q]	Plague, Murine typhus
Anopheles mosquito[Q]	Malaria, Filaria (outside India)
Culex mosquito[Q]	Bancroftian Filariasis, Japanese Encephalitis, West Nile fever, Viral arthritis
Aedes mosquito[Q]	Yellow fever, Dengue, DHF, Chikungunya, Rift Valley fever, Filariasis (Outside India)
Mansonoides mosquito	Malayan (Brugian) filariasis, Chikungunya

Life Cycle of Mosquito

- *Life span of a mosquito varies from*: 8-34 days[Q]
  - Males, as a rule, are short lived
  - Life of a mosquito is influenced by temperature & humidity
- *Life history of a mosquito*:
  - *Egg*: Laid on surface of water, 100-250 at a time
    - Egg stage lasts for 1-2 days
    - *Gonotrophic cycle*: Period that elapses from the moment a blood meal is taken until the eggs are laid; it is about 48 hours in hot & humid tropical areas
  - *Larva*: Passes through 4 stages of growth called *'instars'*, with moulting between each stage
    - Larval stage occupies 5-7 days[Q]
    - Culicine larvae (Culex, Aedes, Mansonia) have a siphon tube[Q]
  - *Pupa*: Represents *'resting stage'* in life cycle of mosquito
    - Pupal stage lasts for 1-2 days
    - Have 2 respiratory tubes (trumpets) in thorax
    - Does not feed, prefers to stay quiet at the water surface
  - *Adult*: Life cycle from egg to adult is complete in 7-10 days
    - Adult mosquito lives for about 2 weeks.

Important Mosquito Vectors in India[Q]

	Anopheles	Culex	Aedes	Mansonia
Diseases transmitted[Q]	Malaria	Bancroftian filariasis, Japanese encephalitis, West Nile fever	Dengue & DHF, Chikungunya, Yellow fever, Rift valley fever	Malayan (Brugian) filariasis
Breeding Habitat[Q]	Clean water	Dirty, polluted water	Artificial collections of water[Q]	Water bodies containing aquatic plants
Eggs	Laid singly, Boat shaped with lateral floats[Q]	Laid in small clusters/rafts	Laid singly, cigar shaped[Q]	Laid in star shaped clusters
Larvae	No siphon tube; Rest parallel to undersurface of water[Q]	Siphon tube; Rest perpendicular to undersurface of water	Siphon tube; Rest in dark bottom corners	Siphon tube; Rest attached to rootlets of plants
Pupae	Broad & short siphon tube	Long & narrow siphon tube	Long & narrow siphon tube	Long & narrow siphon tube
Adults	Inclined at an angle to surface Spotted wings	'Hunch back' rest[Q]	Stripes on body & legs[Q]	-
Flight range	3-5 km	11 km[Q]	100 m[Q]	-
Remark(s)	Sophisticated mosquito	Nuisance mosquito	Tiger mosquito[Q]	-

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Hard Ticks Versus Soft Ticks

	Hard ticks	Soft ticks
Biological name	Ixodidae	Argasidae
Scutum	Present	Absent
Head	At anterior end	Lies ventrally
Spiracles	Behind IV coxa	Behind III and IV coxa
Eggs	Hunderds – thousands in 1 sitting	Batches of 20–100 over long period
Nymphal stages	1	5
Habits	Cannot stand starvation	Can stand starvation for ≥ 1 year
Diseases transmitted[Q]	Tick typhus (RMSF) Viral encephalitis Tick fevers Hemorrhagic fevers (KFD in India) Tularaemia Tick paralysis Human babesiosis	Q fever (few animal cases) Relapsing fever KFD (outside India)

I Phlebotamus argentipes[Q] transmits Kala azar

Housefly

- *'Houseflies should be regarded as a sign of insanitation'* and their number as index of that sanitation[Q]
- *Important species*: *Musca domestica*, M. vicinia, M. nebula, M. sorbens
- *Life span*: 15-25 days
  - Eggs: 8-24 hours
  - Larvae (maggots): 2-7 days
  - Pupae: 3-6 days
  - Adults: 5-20 days
- *Important breeding places* (*in order of importance*)[Q]:
  - Fresh horse manure
  - Human excreta
  - Manure of other animals
  - Garbage
  - Decaying fruits and vegetables
  - Rubbish dumps containing organic matter
  - Grounds where liquid wastes are spilled
- *Feeding habits*:
  - *Housefly does not bite*: It cannot eat solid foods; it vomits on solid foods to make a solution of it, and sucks in a liquid state[Q]
  - *Dispersal*: up to 4 miles
- *Modes of disease transmission*[Q]:
  - Mechanical transmission: Houseflies are known as *'Porters of infection'*
  - Vomit-drop
  - Defecation
- *Houseflies in disease causation*:
  - *As vector of diseases*: Typhoid and paratyphoid fevers, diarrhoeas and dysenteries, cholera and gastroenteritis, amoebiasis, helminthic manifestations, Poliomyelitis, Yaws, Anthrax, Trachoma, conjunctivitis
  - *As causative agent of disease*: Myiasis[Q].

Sandfly

Sandfly species	Diseases transmitted
Phlebotamus argentipes[Q]	Kala azar (Visceral Leishmaniasis)
Phlebotamus papatasii[Q]	Sandfly fever, Oriental sore (Cutaneous Leishmaniasis)
Phlebotamus sergenti[Q]	Oriental sore (Cutaneous Leishmaniasis)
Sergentomyia punjabensis	Sandfly fever

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I Insecticide of choice for sandfly[Q]: DDT

- *Habitats*[Q]: Holes and crevices in walls, holes in trees, dark rooms, stables and store rooms
- *Sanitation measures are carried out for a distance of 50 feet*
- *Insecticide of choice*[Q]: DDT (1 – 2 gm/m^2 single application)
- *DDT is sprayed upto height of 4 – 6 feet of walls*[Q]: as Sandfly cannot fly; it only hops
- *Only female sandflies bite*: Require a blood meal every 3-4 days for oviposition.

Rat Flea (Xenopsylla)

- *Rat flea acts as a vector for*[Q]:
  - Bubonic plague
  - Murine (endemic/flea-borne) typhus
  - Chiggerosis
- *Rat flea acts as a host for*:
  - Hymenolepis diminuta (Rat tapeworm)
  - Hymenolepis nana (Dwarf tapeworm).

I *Rat flea acts as a vector for*[Q]:
- Bubonic plague
- Murine (endemic/flea-borne) typhus
- Chiggerosis

Diseases Associated with Rodents[Q]

Bacterial: Plague Tularaemia Salmonellosis	**Viral:** Lassa fever Hemorrhagic fever Encephalitis
Rickettsial: Scrub typhus Murine (Flea-borne) typhus Rickettsial pox	**Parasitic:** Hymenolepis dimunita Leishmaniasis Amoebiasis Trichinosis Chagas disease
Others: Rat bite fever Leptospirosis Histoplasmosis	

General Principles of Arthropod Control

- *Environmental control*:
  - *Best approach to control of arthropods*, because results are likely to be permanent[Q]
  - *Examples*: Elimination of breeding places (source reduction), filling & drainage operation, planned water management
- *Chemical control*:
  - *No longer fully effective if used alone*: Resistance has appeared in about 100 arthropods of public health importance
  - *Essential to use biodegradable, less toxic compounds*: Methoxychlor, Abate, Dursban
  - *Other examples*: Mosquito larvicidal oil (MLO), Paris green, Pyrethrum.
- *Biological control*:
  - Minimises environmental pollution
  - *EXAMPLES*[Q]:
    - Larvivorous fishes (Gambusia affinis, Lebister reticulates, Poecilia reticulata)
    - Fungi (Coelomomyces)
    - Bacteria (Bacillus thuringiensis H14)
    - Predator mosquito (Toxorhynchitis splendens).
- *Genetic control*:
  - *Techniques*[Q]: Sterile male technique, cytoplasmic incompatibility, chromosomal translocations
- *Newer methods*:
  - *Examples*: Insect growth regulators, chemosterilants, pheromones (sex attractants).

I *Environmental control: Best approach for arthropod control*

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Mosquito Control Measures

- *Anti-larval measures*:
  - *Environmental control*: Source reduction (minor engineering methods – filling, leveling & drainage of breeding places and water management – intermittent irrigation)
    - Filling & drainage of clean water collections – Anopheles
    - Abolition of domestic and peridomestic collections of polluted dirty water – Culex
    - Getting rid of artificial collections of water – Aedes
    - Aquatic plants removed or destroyed by herbicides – Mansonia
  - *Chemical control*:
    - *Mineral oils:* Applied once-a-week in dose of 40–90 litres per hectare; makes water unfit for human consumption and kills fish
    - *Paris green*[Q]: 2 percent dust applied in dose of 1 kg per hectare; *'stomach poison'* to larvae but harmless to humans, animals or fish
    - *Synthetic insecticides:* Abate (very effective larvicide and least toxic at dose of 1 ppm), Malathion, Fenthion, Chlorpyrifos
  - *Biological control*[Q]: through use of small fishes
    - Gambusia affinis
    - Lebister reticulata
    - Poecilia.
- *Anti-adult measures*:
  - *Residual sprays*:

Toxicant	Dosage (gm per m^2)	Average duration of effectiveness (months)
DDT	1 – 2	6 – 12
BHC (Lindane)	0.5	3
Malathion	2	3

  - *Space sprays*:
    - *Pyrethrum extract: 'nerve poison'*; Active principal *'pyrethrin'*; no residual action – short-lived effect[Q]
    - *Residual insecticides:* Malathion and fenitrothion for ULV (Ultra low volume) fogging[Q]
  - *Genetic control*:
    - Sterile male technique
    - Cytoplasmic incompatibility
    - Chromosomal translocations
    - Sex distortion
    - Gene replacement
- *Personal protection measures (against mosquito bites)*:
  - *Mosquito nets*:
    - No. of holes per square inch: 150[Q]
    - Size of each hole diameter: < 0.0475 inch[Q]
    - *Screening*:
      1. Size: 16 meshes to inch
      2. Aperture size: < 0.0475 inch
  - *Repellants*[Q]:
    - Diethyltoulamide (DEET)
    - Ethyl hexanediol
  - *Pyrethrum*:
    - *Space spray for killing adult mosquitoes*[Q]
    - *Contact poison*
    - *Knock-down effect with paralysis*[Q]

I Pyrethrum extract: *'nerve poison'*

I Mosquito Nets:
No. of holes per square inch: 150[Q]
Size of each hole diameter: < 0.0475 inch[Q]

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I

Insecticide treated bed nets (ITBN): Synthetic pyretheroids[Q]

- Insecticide of plant origin: Flowers of Chrysanthemum
- 5 active principles (all *'nerve poisons'*) [Q]:
  1. Pyrethrin I
  2. Pyrethrin II
  3. Cinerin I
  4. Cinerin II
  5. Jasmoline II
- No residual effect: Short lived effect
- Synthetic pyrethroids: permethrin, allethrin, furethrin, cyclethrin
- Because of the natural insecticidal properties used as *'companion plants'*, to repel pest insects from nearby crops.

- *Common insect repellents*:
  - DEET (*N,N*-diethyl-*m*-toluamide) [Q]
  - Allethrin
  - Essential oil of the lemon eucalyptus [p-menthane-3,8-diol (PMD)]
  - Icaridin (picaridin)
  - Nepetalactone (catnip oil)
  - Citronella oil
  - Permethrin
  - Soyabean oil
  - Neem oil
- *Few uncommon insect repellants*:
  - Thiamine (vitamin B1)
  - Garlic
  - Incense
  - Ultrasonic devices
- *Bacillus thuringiensis H14*[Q]: Spores and crystalline insecticidal proteins produced by B. thuringiensis are used as specific insecticides. Because of their specificity, these pesticides are regarded as environmentally friendly, with little or no effect on humans, wildlife, pollinators, and most other beneficial insects.
  - *Bacillus thuringiensis* serovar *israelensis* is widely used as a larvicide against mosquito larvae (Bt Toxin)
- *Insecticide treated bed nets* (*ITBN*):
  - Chemicals used in ITBN Program: *Synthetic pyretheroids*[Q]
    1. Deltamethrin: 2.5 % in dosage of 25 mg/m2
    2. Cyfluthrin: 5 % in dosage of 50 mg/m2
    3. Other insecticides used: Permethrin, Lambdacyhalothrin, Etofenprox, -cypermethrin
  - *Effectiveness of pyretheroids*[Q]: 6-12 months (Retreatment every 6 months)
  - *Long-lasting insecticidal mosquito nets* (*LLINs*): Also use pyrethroid insecticides, and a chemical binder that allows the nets to be washed ≥20 times, allowing use for ≥3 years.

Insecticides

- *Organo-phosphorus Insecticides*[Q]:
  - Malathion
  - Parathion
  - Fenthion
  - Diazinon
  - Fenitrothion
  - Chlorpyrifos
  - Dioxathion
  - Chlorthion

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- *Organo-chlorine Insecticides*Q:
  - DDT
  - BHC (HCH)
  - Lindane
  - Dieldrin
- *Carbamate Insecticides*:
  - Carbaryl
  - Propoxur.

I *Paris green is a 'stomach poison*

Paris Green (Copper Acetoarsenite)

- *Description*:
  - Emerald green, microcrystalline powder
  - Anti-larval measure, kills mainly Anopheles larvae as they are surface feedersQ
  - Bottom feeding larvae can also be killed, when applied as a special granular formulation
  - *Paris green is a 'stomach poison'*Q
  - Is most widely used larvicide for mosquito control
- *Recommended dose*: 1 kg paris green per hectare water surface
  - In dosage applied, paris green does not harm fish, man or domestic animals.

I Paul MullerQ (Nobel prize)
– DDT properties

DDT (Dichloro-diphenyl-trichloro ethane)

- *Type of insecticide*: Organochlorine compoundQ
  - *Synthesised by*: ZiedlerQ
  - *Properties discovered by*: Paul MullerQ (Nobel prize)
  - *Most active form*: Para-para isomer (70-80% in DDT)Q
- *Mechanism of action*:
  - *Contact poison*: Nerve poison which inhibits Acetylcholinesterase enzymeQ
  - Takes several hours to killQ (No immediate death)
  - Residual action lasts for 18 monthsQ
  - No repellent actionQ
- *Application*: 100-2000 mg per sq. foot
  - *Dosage*: 100-200 mg per sq.ft.
- *Technical DDT*: 70-80% para-para isomer (most active form)Q
- Sandflies (Phlebotamus) have not demonstrated resistance to DDTQ.

I *Mechanism of action of DDT: Contact poison: (Nerve poison)*
*Takes several hours to kill*Q
Residual action for 18 months

Pyrethrum

- *Description*:
  - Insecticide of plant origin: Flowers of Chrysanthemum
  - *Space spray for killing 'adult mosquitoes'*Q: Active principal *'pyrethrin'*; no residual action – short-lived effect
- *Mechanism of action*:
  - *Contact 'nerve' poison*Q
  - *Knock-down effect with paralysis*
- 5 active principles (all *'nerve poisons'*):
  - Pyrethrin I
  - Pyrethrin II
  - Cinerin I
  - Cinerin II
  - Jasmoline II
- *No residual effect*: Short lived effect.

I *Technical DDT: 70-80%* para-para isomer

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I Malathion
Is 'least toxic among Organophosphate compounds'

Malathion

- Is *'least toxic among Organophosphate compounds'* Q
  - Because of its low toxicity, it is recommended as *'an alternative to DDT'*
  - *Dosage*: 100-200 mg per sq. ft. every 3 months
  - *ULV spray*: Used to kill adult mosquitoes
- *Mechanism of action*: Interfere with transmission of nerve impulses
  - Act by *'inhibiting Acetyl-cholinesterase'* Q.

Scabies

I *Drug of Choice for scabies:* 5% Permethrin Q

- *Scabies*: Is a transmissible ectoparasite skin infection characterized by superficial burrows, intense pruritus (itching) and secondary infection Q
  - Scabies is caused by the mite *Sarcoptes scabei*, variety *hominis* (known as *'Itch mite'*) Q
  - Scabies is usually transmitted by close contact with an infested person. Scabies is transmitted readily, often throughout an entire household, by skin-to-skin contact with an infected person and thus is sometimes classified as a sexually transmitted disease (STD)
- *Drug of Choice for scabies*: 5% Permethrin Q
- *Other treatment modalities for Scabies* Q:
  - 25% Benzyl benzoate (2 applications)
  - 1% HCH (*Gammaxene; lindane*) (2 applications)
  - 5% Tetmasol solution (3 daily applications)
  - 10% Sulphur ointment (4 daily applications)
  - Crotamiton lotion (3 applications)
  - Malathion (1 application)
  - Ivermectin (Single dose)—Oral/Systemic Drug of Choice Q
  - Neem oil (for persistent cases).

I Ivermectin (Single dose)—Oral/Systemic Drug of Choice for scabies

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MULTIPLE CHOICE QUESTIONS

WATER

1. **Purest water in nature is:** *[AIPGME 2000]*
   (a) River water
   (b) Rain water
   (c) Deep well
   (d) Impounding reservoirs

2. **All the following statements are true about break point chlorination, *except*:** *AIIMS May 2004]*
   (a) Free chlorine is released in water after break point chlorination
   (b) Chlorine demand is the amount needed to kill bacteria, oxidize organic matter and neutralize ammonia
   (c) 1 ppm free chlorine should be present in water after break point has reached
   (d) Contact period of 1 hour is necessary

3. **Nitrates in excess of—may cause infantile methaemoglobinaemia:** *[AIPGME 1997]*
   (a) 15 mg/l
   (b) 25 mg/l
   (c) 35 mg/l
   (d) 45 mg/l

4. **All the following provide evidence of faecal pollution *except*:** *[AIIMS Sep 1996]*
   (a) Faecal streptococci
   (b) Coliform
   (c) Cl. Tetani
   (d) Enterpathogenic virus

5. **Per capita allowance of water per day is recommended at:** *[AIIMS Nov 2005]*
   (a) 70-80 lit
   (b) 80-120 lit
   (c) 120-150 lit
   (d) 150-200 lit

6. **Recommended standard for bacterial water quality in small community supplies is:** *[AIIMS Dec 1997]*
   (a) No coliform
   (b) No E coli in 100 ml
   (c) Coliform less than 10/100 ml
   (d) Coliform less than 1/100 ml

7. **Temporary hardness of water is primarily due to the presence of:** *[AIIMS Nov 2007]*
   (a) Calcium and magnesium sulphates
   (b) Calcium and magnesium chlorides
   (c) Calcium and magnesium bicarbonates
   (d) Calcium and magnesium nitrates

8. **Horrock's apparatus estimates:** *[AIIMS May 2006]*
   (a) Free chlorine
   (b) Combined chlorine
   (c) (a) + (b)
   (d) Chlorine demand

9. **Which one of the following methods is used for the estimation of chlorine demand of water?** *[AIIMS Nov 2006, AIIMS May 2007, 2010, RJ 2001]*
   (a) Chlorometer
   (b) Horrock's apparatus
   (c) Berkefeld filter
   (d) Double pot method

10. **Ortho-toulidine test is used to determine:** *[AIIMS Nov 1995, AIIMS Nov 2004, WB 2002]*
    (a) Nitrates in water *[AIPGME 2011]*
    (b) Nitrites in water *[Recent Question 2012]*
    (c) Free and combined chlorine in water
    (d) Ammonia content in water

11. **Most desired temperature range for drinking water is:**
    (a) 0-5°C *[AIIMS May 1995]*
    (b) 5-10°C
    (c) 10-15°C
    (d) 15-20°C

12. **Most undesirable metal in drinking water is:**
    (a) Iron *[AIIMS June 1991]*
    (b) Copper
    (c) Zinc
    (d) Lead

13. **'Most reliable' evidence of fecal contamination of water is provided by:** *[AIPGME 1999]*
    (a) Coliform bacteria
    (b) Cl. Perfringens
    (c) St. fecalis
    (d) Cl. welchii

14. **Scabies, an infection of the skin caused by Sarcoptes scabiei, is an example of:** *[AIPGME 2002]*
    (a) Water borne disease
    (b) Water washed disease
    (c) Water based disease
    (d) Water related disease

15. **A daily water supply considered adequate to meet the need for all urban domestic purposes is:**
    (a) 10 litres per capita *[AIIMS Nov 2000]*
    (b) 20 litres per capita

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(c) 40-60 litres per capita
(d) 150-200 litres per capita

16. All are "Water-Washed Diseases" *except*: *[AIIMS June 2000]*
(a) Scabies
(b) Trachoma
(c) Typhoid
(d) Conjunctivitis

17. All are true for Rapid Sand Filters *except*:
(a) No preliminary storage of raw water is required
(b) Operation requires highly skilled persons
(c) Frequent washing is not required *[AIPGME 1997]*
(d) Can be gravity type or pressure type

18. Disinfecting action of chlorine on water is mainly due to: *[AIPGME 2005]*
(a) Hydrogen chloride *[Recent Question 2013]*
(b) Hypochlorous acid *[DNB 2001, 2011, RJ 2001]*
(c) Hypochlorite ions
(d) Hydrogen ions

19. Which of the following agents have 'residual germicidal effect' when used for disinfection of water:
(a) Chlorine only *[AIIMS Dec 1995]*
(b) Chlorine and Ozone gas
(c) Chlorine and UV radiation
(d) Chlorine, Ozone gas and UV radiation

20. Proposed guideline values for Radioactivity in Drinking water is: *[AIPGME 2001]*
(a) Gross a activity 0.1 Bq/L and Gross b activity 1.0 Bq/L
(b) Gross a activity 1.0 Bq/L and Gross b activity 0.1 Bq/L
(c) Gross a activity 1.0 Bq/L and Gross b activity 10.0 Bq/L
(d) Gross a activity 10 Bq/L and Gross b activity 1.0 Bq/L

21. MPN Multiple Tube Method is done to:
(a) Detect the presence of Coliform organisms in a sample of water *[AIIMS Dec 1995]*
(b) Detect the presence of Faecal streptococci in a sample of water
(c) Detect the presence of Cl. perfringens in a sample of water
(d) Do the colony count of bacteria

22. Level of hardness in soft water is ___ mEq/liter:
(a) Less than 1 *[AIIMS Nov 1999]*
(b) 1-3
(c) 3-6
(d) Over 6

23. To find out the dose of bleaching powder required for disinfection of water, following is used:
(a) Chloroscope *[AIIMS Dec 1994-95]*
(b) Chloronome
(c) Horrock's apparatus
(d) Winchester Quart Bottle

24. Indicator solution in Horrock's Apparatus contains:
(a) Ortho-toulidine *[AIIMS Nov 2006]*
(b) Starch iodide
(c) Ortho-toulidine arsenite
(d) Bromocresol purple

25. The minimum recommended dose of "free" residual chlorine in water for routine chlorination (in mg/ lts) is: *[AIPGME 2002, MP 2003, PGMCET 2015, AIIMS May 1991]*
(a) 0.5 mg/l for a contact period of 1hr *[Bihar 2004]*
(b) 0.5 mg/l for a contact period of 1/2 hr *[DNB 2008]*
(c) 1.0 mg/l for a contact period of 1hr
(d) 1.0 mg/l for a contact period of 1/2 hr *[Karnataka 2009, WB 2004, RJ 2000, 2005]*

26. True statement regarding chlorination is
(a) Orthotolidine test measures combined chlorine separately: *[DPG 2005]*
(b) Chlorine acts best when pH is around 7
(c) It kills bacteria, viruses and spores
(d) Hypochlorite ions are mainly responsible for disinfecting activity

27. What is the amount of bleaching powder required to disinfect 455 litre of water if 4, 5, 6 cup shows distinct colouration in Horrock's apparantus? *[DPG 2007]*
(a) 2 g
(b) 6 g
(c) 8 g
(d) 4 g

28. Temporary hardness of water is due to presence of: *[Karnataka 2004]*
(a) Bicarbonates of calcium and magnesium
(b) Chlorides of calcium and magnesium
(c) Nitrates of calcium and magnesium
(d) Oxides of calcium and magnesium

29. When the level of hardness in water is around 150-300 mg / litre it is classified as: *[Karnataka 2008]*
(a) Very hard water
(b) Hard water
(c) Moderately hard water
(d) Soft water

30. Slow sand filter is differentiated from rapid sand filter by: *[PGI June 08]*
(a) Bacteria are removed more effectively
(b) Skilled person is needed
(c) Cost construction is cheaper
(d) Sand particle are of smaller size
(e) Longer duration is needed

31. Indication of Fecal contamination of water is due to presence of: *[PGI Dec 03]*
(a) E. coli
(b) Coliform

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(c) Enterococci
(d) Clostridium difficile
(e) Streptococcus pyogenes

32. NOT seen in fecal pollution: *[AIIMS May 2010]*
(a) Staphylococcus
(b) Streptococcus
(c) E.coli
(d) Clostridium perfringens

33. All of the following statements about purification of water are true *except*: *[AIIMS May 2010]*
(a) Presence of Clostridial spores indicates recent contamination of water
(b) Coliforms must not be detectable in any 100 ml sample of drinking water
(c) Sodium thiosulphate is used to neutralize certain contaminants
(d) Coliforms may be detected by multiple tube method and indole production

34. All the following statements about purification of water are true *except*: *[AIIMS May 2011]*
(a) Presence of clostridial spores indicate recent contamination
(b) Coliforms must not be detectable in any 100 ml sample of drinking water
(c) Sodium thiosulphate is used to neutralize chlorine
(d) Coliforms may be detected by multiple tube method and indole production at 44 degrees

35. In a slow sand filter, the element responsible for yielding bacteria free water is the: *[Karnataka 2011]*
(a) Valve
(b) Vital layer
(c) Supernatant water
(d) Under-drainage system

36. True about slow sand filter is: *[Recent Question 2013]*
(a) Occupies less space
(b) More expensive
(c) Requires longer duration
(d) Sand size 0.4-0.7 mm

37. Coliform test is for: *[Recent Question 2013]*
(a) Air pollution
(b) Water contamination
(c) Sound pollution
(d) None

38. Softening is recommended when hardness of water is more than: *[Recent Question 2012]*
(a) 50 mg/litre
(b) 75 mg/litre
(c) 100 mg/litre
(d) 150 mg/litre

39. The vital layer in a slow sand filter is: *[DNB June 2011]*
(a) Sand bed
(b) Under drainage
(c) Zoological layer
(d) Supernatant

40. Horrock's apparatus determines Chloride which has to have a holding level of: *[Recent Question 2012]*
(a) 1.0 mg/L
(b) 1.5 mg/L
(c) 2.0 mg/L
(d) 0.5 mg/L

41. Process of deflouridation of water is:
(a) Nalgonda technique *[Recent Question 2012]*
(b) Soaking
(c) Sand filter
(d) Parboiling

42. Criteria for drinking water quality recommended by WHO includes: *[PGI May 2013]*
(a) Colour <15 TCU
(b) pH 6.5 – 8.5
(c) Chloride 200-600 mg/l
(d) Turbidity <5 NTU
(e) Zinc <4 mg/l

43. Hardness of drinking water should be:
(a) >3 *[Recent Question 2013] [DNB December 2011]*
(b) <1
(c) 1-3
(d) >3

44. Faecal contamination of drinking water is evaluated by:
(a) Klebsiella *[Recent Question 2012]*
(b) E. coli
(c) Proteus
(d) Coagulase negative staphylococci

45. Nalgonda technique for defluoridation is in what sequence: *[Recent Question 2012]*
(a) Lime + Alum
(b) Soda + Alum
(c) Alum + Soda
(d) Alum + Lime

46. A chloride level_____ is said to be accepted by WHO:
(a) 0.2 mg/L *[DNB 2007]*
(b) 0.5 mg/L
(c) 45 mg/L
(d) 200 mg/L

47. Minimum chlorine content of water after chlorination should be: *[DNB December 2011]*
(a) 0.5 mg/L
(b) 5 mg/L
(c) 0.05 mg/L
(d) 50 mg/L

48. Bacterial indicator of recent contamination of water is?
(a) Clostridium perfringens *[Recent Question 2013]*
(b) E.coli *[DNB 2011]*
(c) Clostridium welchii
(d) Faecal streptococci

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49. **Confirmatory Test for coliform count:** *[Recent Question 2013]*
    (a) Eijkman test
    (b) Casoni's test
    (c) Nitrate test
    (d) Urease test

50. **Safe water criteria include:** *[PGI November 2013] [AIPGME 1992]*
    (a) Free from pathogens
    (b) Free from harmful chemicals
    (c) Free from chlorine
    (d) Free from colour and odour
    (e) Usable for agricultural purposes

51. **Method of choice for purification of highly polluted water on a large scale is:** *[AP 2014]*
    (a) Boiling
    (b) Chlorination
    (c) Super chlorination followed by dechlorination
    (d) Ultraviolet light treatment

52. **Minimum residual chloride level post-epidemic** *[Recent Question 2015]*
    (a) 0.2 mg/L
    (b) 0.5 mg/L
    (c) 5 mg/L
    (d) 10 mg/L

53. **Test for recent contamination of water is** *[CGPG 2015]*
    (a) Nitrates
    (b) Nitrites
    (c) Ammonia
    (d) Chlorides

Review Questions

54. **Not a feature of hard water is:** *[Bihar 2005]*
    (a) Increased fuel consumption
    (b) Erosion of lead pipe
    (c) Scaling of boiler
    (d) Decreased soap consumption

55. **Fresh bleaching powder contains:** *[Bihar 2005] [WB 2009]*
    (a) 33% chlorine
    (b) 3.3% chlorine
    (c) 0.33% chlorine
    (d) 0.033% chlorine

56. **All are example of water borne disease *except*:** *[UP 2000]*
    (a) Leptospirosis
    (b) Fish tapeworm
    (c) Shistosomiasis
    (d) Brucellosis

57. **Bacteriological quality of drinking water is small community is acceptable upto:** *[UP 2004, Kerala-01]*
    (a) No coliform bacteria in water
    (b) 10 coliform bacteria in 100 ml water
    (c) 10 E. coli in 100 ml III water
    (d) 100 E. coli in 100 ml. Water

58. **All the following assess the water-quality-criteria for water pollution are all *except*:** *[UP 2006]*
    (a) Solid particles
    (b) Dissolved oxygen
    (c) Dissolved chloride
    (d) Dissolved nitrogen

59. **Maximum permissible chloride level is:** *[UP 2008]*
    (a) 200 mg/litre
    (b) 300 mg/litre
    (c) 500 mg/litre
    (d) 600 mg/litre

60. **Action of Bleaching powder is due to release of:**
    (a) Free Chlorine *[AP 2001]*
    (b) Lime
    (c) Hydrochloric acid
    (d) Hydrogen ions

61. **Vital layer in slow sand filter is seen:** *[AP 2004]*
    (a) Top of water
    (b) On the sand bed
    (c) Near filter valves
    (d) None

62. **Contact time for chlorination:** *[AP 2005, 2008]*
    (a) 4 hrs
    (b) 1 hr
    (c) 11/2 hr
    (d) 2 hrs

63. **Effective size of sand in rapid sand filter is:** *[AP 2008]*
    (a) 0.2 mm
    (b) 0.5 mm
    (c) 0.8 mm
    (d) 0.1 mm

64. **When river water is stored for the first 5-7 days, the bacterial count drops by as much as:** *[TN 2003]*
    (a) 25%
    (b) 50%
    (c) 90%
    (d) 100%

65. **The vital layer of slow sand filter is:** *[TN 2005]*
    (a) Schmutzdecke
    (b) Under-drainage system
    (c) Supernatant water
    (d) Filter control valves

66. **Most effective water treatment method in rural area:**
    (a) Rapid sand filter *[MP 2002]*
    (b) Slow and filter
    (c) Chlorination of water
    (d) Ozonization

67. **Criteria for safe drinking water:** *[MP 2004]*
    (a) pH 6.5-8.5
    (b) Chloride 0.8 g/L
    (c) Nitrate 0.2 g/L
    (d) Solids-12000 mg/L

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68. Schmutzdecke refers to the following: *[MP 2007]*
(a) Suspended matter in drinking water
(b) Algae in drinking water
(c) Alum flocculate on surface of sand bed filter
(d) Algae, plankton, diatoms and bacteria on surface of sand bed filter

69. Water sample from a well was tested using Horrock's apparatus. It was observed that 3rd white cup showed blue colour after addition of starchiodide indicator: How much bleaching powder is required to disinfect 2275 liters of the well water? *[MP 2008]*
(a) 5 gm
(b) 15 gm
(c) 25 gm
(d) 30 gm

70. One chlorine tablet is efficient to chlorinate how many liters of water? *[MH 2002, 2003]*
(a) 10 liters
(b) 20 liters
(c) 30 liters
(d) 40 liters

71. Drawback of ozone as water disinfectant is: *[MH 2003]*
(a) No virucidal effect
(b) Long time period for action
(c) Teratogenicity
(d) No residual action

72. Criteria for "Problem village" include all *except*: *[JIPMER 1998, MH 2006]*
(a) Where no water source in a distance of 1.6 km from community
(b) Water is more than depth of 15 meter
(c) There is excess of Na+, K+, F+ salts
(d) Risk of Guinea worm infection

73. Recommended hardness of water (mequ/L): *[RJ 2002]*
(a) 50-150
(b) 150-300
(c) 300-500
(d) 700

AIR

74. Psychrometer is used to measure: *[AIPGME 2008]*
(a) Humidity
(b) Air velocity
(c) Room temperature
(d) Radiant heat

75. All of the following are types of mechanical ventilation *except*: *[AIIMS May 1995]*
(a) Perflation and Aspiration
(b) Exhaust ventilation
(c) Plenum ventilation
(d) Air conditioning

76. All are indicators of air pollution *except*:
(a) Soiling index *[AIIMS May 1995]*
(b) McArdle's index
(c) Suspended particle count
(d) SO_2 Concentration

77. McArdle's maximum allowable sweat rate is:
(a) 4 lit /4 hours *[AIIMS June 1997]*
(b) 4 lit /1 hours
(c) 4.5 lit/4 hours
(d) 4.5 lit/8 hours

78. Kata thermometer measures: *[AIIMS Dec 1998]*
(a) Air temperature only *[Recent Question 2012]*
(b) Air temperature and humidity *[Karnataka 2004]*
(c) Air temperature, humidity and air movement
(d) Air velocity only

79. 'Cooling Power' of air is measured by:
(a) Kata thermometer *[AIIMS Nov 2000]*
(b) Hygrometer
(c) Anemometer
(d) Sling's Psychrometer

80. The mechanical system in which fresh air is blown into the room by centrifugal fans so as to create positive pressure and displace the vitiated air is termed as:
(a) Balanced ventilation *[Karnataka 2009]*
(b) Air conditioning
(c) Exhaust ventilation
(d) Plenum ventilation

81. The mean radiant temperature is measured by:
(a) Dry bulb thermometer *[Karnataka 2004]*
(b) Wet bulb thermometer
(c) Six's maximum and minimum thermometer
(d) Globe thermometer

82. The instrument used for recording very low air velocities is: *[Karnataka 2005]*
(a) Globe thermometer
(b) Kata thermometer
(c) Anaemometer
(d) Sling psychrometer

83. Global warming true is: *[AIIMS May 2010]*
(a) CO_2 is a major greenhouse gas
(b) Stratosphere ozone layer is harmful
(c) CFC increases stratosphere ozone layer
(d) Kyoto protocol called for 20% reduction in greenhouse emissions

84. Which of the following is not a source of Indoor Air Pollution? *[AIPGME 2011]*
(a) Carbon monoxide
(b) Nitrogen dioxide
(c) Radon
(d) Mercury vapour

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85. **Indoor air pollution does not cause:** *[AIIMS PGMEE November 2013]*
(a) Chronic lung disease
(b) Pregnancy problems
(c) Childhood pneumonia
(d) Neuro-developmental problems

86. **Which of the following is non-natural gas causing green house effect?** *[Recent Question 2012]*
(a) Carbon dioxide
(b) Methane
(c) Ozone
(d) CFCs

87. **The best parameter to measure air pollution is:**
(a) SO_2 *[DNB 2002, 2005, 2006, 2007, UP 2002]*
(b) CO_2 *[Bihar 2004, RJ 2006]*
(c) CO
(d) N_2O

88. **Acceptable level for physical comfort:** *[DNB 2008, UP 2005, Recent Question 2013]*
(a) Corrected effective temperature 77-80°F
(b) Corrected effective temperature 70-76°F
(c) Corrected effective temperature 80-81°F
(d) Corrected effective temperature >82°F

89. **Air velocity is measured by:** *[Recent Question 2012]*
(a) Hygrometer
(b) Psychrometer
(c) Anemometer
(d) Wet bulb thermometer

90. **Which agency monitors air quality in India?**
(a) Central Research Institute *[Recent Question 2012]*
(b) Ministry if health and Family Welfare
(c) National Environmental Engineering Research Institute
(d) Central Pollution Control Board

91. **In winter, water vapours and pollutants comes to lie in the lowermost layer of atmosphere by:**
(a) Acid rain *[Recent Question 2013]*
(b) Green house effect
(c) Temperature inversion
(d) Ocean effect

92. **At which level of heat stress index it is not possible to work comfortably causing threat to health:**
(a) 20 - 40 *[Recent Question 2012]*
(b) 40 - 60
(c) 60 - 80
(d) 80 – 100

93. **Which of the following is not a feature of heat stress?** *[UPSC CMS 2015]*
(a) Hyperpyrexia
(b) Syncope
(c) Cramps
(d) Numbness

Review Questions

94. **Number of air changes in a drawing room per hour should be at least:** *[DNB 2000, 2006, 2008]*
[Recent Question 2013]
(a) 2-3
(b) 3-4
(c) 4-5
(d) 5-6

95. **Number of air changes in one hour in a work room should be at least:** *[DNB 2001]*
(a) 2-3
(b) 3-4
(c) 4-6
(d) 5-7

96. **Acceptable level for physical comfort:** *[DNB 2008]*
(a) Corrected effective temperature 79°F
(b) Corrected effective temperature 70-76°F
(c) Corrected effective temperature 80-81°F
(d) Corrected effective temperature > 82°F

97. **In Indoor air pollution, carbon monoxide is produced by:** *[UP 2007]*
(a) Combustion equipment
(b) Stove
(c) Gas heaters
(d) All of the above

98. **Kata thermometer is used nowadays to determine:** *[AFMC 2000, Karnataka 2004, UPSC 2000, TN 2000]*
(a) Air velocity
(b) Humidly of air
(c) Direction of air flow
(d) Cooling power of air

99. **CO_2 in air is measured by:** *[Kolkata 2003]*
(a) Manometer
(b) Hygrometer
(c) Kiffer test
(d) None

100. **Relative humidity is determined by:**
(a) Kata thermometer *[Karnataka 2005]*
(b) Anemometer *[MH 2000]*
(c) Sling psychrometer
(d) Gardbad apparatus

SOUND

101. **Whispering produces a sound of:** *[AIIMS May 1993]*
(a) 20-30 dB
(b) 30-40 dB
(c) 40-50 dB
(d) 50-60 dB

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102. Exposure to following minimum level of sound can cause rupture of tympanic membrane, leading to permanent hearing loss: *[AIPGME 2000]*
(a) 90 dB
(b) 110 dB
(c) 160 dB
(d) 1600 dB

103. An upper limit of noise which people can tolerate without damage to their hearing is: *[Karnataka 2004]*
(a) 45 dB
(b) 65 dB
(c) 85 dB
(d) 105 dB

104. Exposure to noise above ……. cause permanent loss of hearing: *[DNB 2007]*
(a) 85 dB
(b) 90 dB
(c) 100 dB
(d) 160 dB

Review Questions

105. The decibels above which auditory fatigue occurs is: *[DNB 2003]*
(a) 60 dB
(b) 70 dB
(c) 85 dB
(d) 140 dB

106. The 'acceptable' noise level is: *[UP 2006] [Recent Question 2013]*
(a) 85 dB
(b) 90 dB
(c) 95 dB
(d) 100 dB

107. Pain in the ear occurs at: *[Kolkata 2002]*
(a) 80 dB
(b) 120 dB
(c) 140 dB
(d) 160 dB

108. Highest permissible intensity of sound is: *[MP 2003]*
(a) 65 dB
(b) 85 dB
(c) 90 dB
(d) 80 dB

109. Repeated exposure to_____ can cause permanent deafness is: *[MH 2002]*
(a) 160 dB
(b) 60 dB
(c) 90 dB
(d) 100 dB

110. Upper limit of exposure to noise up to which there is no damage to hearing? *[Karnataka 2004, MH 2005]*
(a) 160 dB
(b) 70 dB
(c) 85 dB
(d) 100 dB

111. Upper limit of tolerance of noise/day is (decibel): *[RJ 2004]*
(a) 10
(b) 85
(c) 100
(d) 125

LIGHT

112. Recommended illumination range for regular work is _____ foot-candles: *[AIPGME 2001]*
(a) 6-12
(b) 25-50
(c) 50-75
(d) 75-100

113. Day light factor in living room should be:
(a) 8% *[Recent Question 2013] [DNB June 2009]*
(b) 6%
(c) 10%
(d) 15%

HOUSING

114. The optimum floor space recommended per adult person in a dwelling place is: *[AIIMS Nov 1999]*
(a) 50–100 sq.ft.
(b) 101–450 sq.ft.
(c) 151–200 sq.ft.
(d) 201–250 sq.ft.

115. The optimum floor space recommended per adult person in a house *[Karnataka 2004]*
(a) 70–90 sq. ft.
(b) 101–150 sq.ft.
(c) 151–200 sq.ft.
(d) 201–250 sq. ft.

WASTE DISPOSAL

116. All of the following are methods of sewage disposal *except*: *[AIPGME 2006]*
(a) River outfall
(b) Land treatment
(c) Oxidation ponds
(d) Bangalore method (Composting)

117. Waste water from kitchen is called: *[AIIMS Dec 1997]*
(a) Refuse
(b) Garbage
(c) Sullage
(d) Sewage

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118. The amount of sewage flowing in a system in 24 hours is called: *[AIIMS Nov 2000]*
(a) Sewage rate
(b) Dry weather flow
(c) RCA index
(d) Sludge

119. A good trap should have effective seal of:
(a) 2.5 cm *[AIIMS May 1993]*
(b) 5 cm
(c) 7.5 cm
(d) 10 cm

120. All are features of septic tank *except*: *[AIPGME 92]*
(a) Ideal retention period – 48 hrs
(b) Minimum capacity – 500 gallons
(c) Aerobic oxidation takes place outside
(d) Sludge is solids setting down

121. Sullage consists of: *[AIPGME 2002]*
(a) Solid vegetable waste matter
(b) Inorganic waste *[Recent Question 2013]*
(c) Waste containing human excreta
(d) Waste water from kitchen

122. Most satisfactory method of Refuse disposal is:
(a) Dumping *[AIIMS May 1993-2003]*
(b) Controlled tipping *[AIPGME 1994]*
(c) Incineration *[Bihar 2003]*
(d) Manure pits

123. The depth of Water Seal in RCA Latrine is:
(a) 1 cm *[AIIMS Dec 1991]*
(b) 2 cm
(c) 5 cm
(d) 12 cm

124. Strength of sewage is expressed in terms of all *except*:
(a) E. Coli Count *[AIPGME 2006]*
(b) Suspended particles
(c) Chemical oxygen demand
(d) Biological oxygen demand

125. The biological oxygen demand (BOD) indicates:
(a) Organic matter *[AIPGME 2002, AIIMS June 2000]*
(b) Bacterial content
(c) Anaerobic bacteria
(d) Chemicals

126. Waste water without human excreta is called:
(a) Sewage *[DPG 2006, MH 2005, RJ 2005]*
(b) Humus
(c) Sullage
(d) Effluent

127. Following latrines are suitable for camps and temporary use *except*: *[Karnataka 2004]*
(a) Shallow trench latrine
(b) Pit latrine
(c) Borehole latrine
(d) Septic tank

128. Biochemical oxygen demand is calculated to know:
(a) Organic waste
(b) Inorganic waste
(c) Total solids
(d) Toxic substances

129. Following are the waste types not to be incinerated *except*: *[Karnataka 2009]*
(a) Pressurized gas containers
(b) Reactive chemical waste
(c) Halogenated plastics
(d) Content of combustible matter above 60%

130. It waste water contain toxic substances, organic load is measured by: *[Recent Question 2013]*
(a) Biological oxygen demand
(b) Chemical oxygen demand
(c) Suspended solid
(d) None

131. The heart of activated sludge process is:
(a) Aeration tank *[Recent Question 2012]*
(b) Primary sedimentation
(c) Digestion tank
(d) Secondary sedimentation tank

132. Septic tank true is/are: *[PGI November 2014]*
(a) Treatment of household sewage
(b) Suitable in presence of public sewerage system
(c) Aerobic oxidation outside septic tank
(d) Anaerobic digestion inside septic tank
(e) Retention period 6 hours

133. True about Sewage is/are: *[PGI November 2014]*
(a) Does not contain human excreta
(b) Strength measured by Biological oxygen demand
(c) BOD >100 mg/L is strong sewage
(d) Composed of 90% water
(e) Dry weather flow is measured for 24 hours period

Review Questions

134. The sewage ground water is disposed by: *[DNB 2002]*
(a) Oxidation pond
(b) Soakage pit
(c) Activated sludge process
(d) Any of the above

135. Not a feature of septic tank: *[Bihar 2005]*
(a) Used for personal and small public use
(b) Water tight compartment
(c) Used where water supply is adequate
(d) Used where public sewerage system is adequate

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136. Trickling filter is used in: *[UP 2000]*
(a) Primary treatment of sewage
(b) Secondary treatment of sewage
(c) Swage effluent treatment
(d) Sewage farming treatment

137. Best method for disposal of refuse where land is available: *[Kolkata 2008]*
(a) Burial
(b) Dumping
(c) Manure pit
(d) Controlled tipping

138. Most important prerequisite in sanitary latrine is:
(a) Water seal *[MP 2002]*
(b) Adequate drainage
(c) Squatting plate/slab
(d) Smooth slope of the pan

139. Septic tank true is: *[MP 2004]*
(a) Always double chamber
(b) Minimum 200 galon capacity
(c) Depth is from 5-7 feet
(d) Retention period is of 24 hrs

140. The function of grit chamber in modern sewage plants is: *[MP 2008]*
(a) Formation of sludge
(b) Removal of floating large objects
(c) Settlement of heavy objects
(d) Formation of Zoogleal layer

141. Strength of sewage is expressed in terms of all *except*:
(a) Biological Oxygen Demand
(b) Chemical oxygen demand
(c) Suspended solids
(d) Coliform count *[JIPMER 1985, TN 1993, MH 2006]*

142. Sullage in rural area is disposed by: *[RJ 2001]*
(a) Gobar gas plant
(b) Septic tank
(c) Sewage system
(d) Incineration

143. Poliovirus transmission does not occur through:
(a) Sewage *[RJ 2005]*
(b) Sullage
(c) Both
(d) None of these

MISCELLANEOUS (ENVIRONMENT)

144. Which of the following is not a recommended sanitation measure for swimming pool sanitation?
(a) Recommended area per swimmer = 2.2 sq. metre
(b) Water to be refiltered in less than 6 hours (rapid sand filters) *[AIIMS May 2005]*
(c) Residual level of free chlorine to be > 0.5 ppm
(d) 15% water to be replaced by fresh water every day

145. The permissible dose of man made radiation should not exceed: *[Karnataka 2004]*
(a) 3 rads per year
(b) 5 rads per year
(c) 8 rads per year
(d) 10 rads per year

146. 10-days rule is related to: *[Recent Question 2012]*
(a) Sewage disposal
(b) Air quality
(c) Water quality
(d) Radiation protection in pregnancy

147. Unit of absorbed radiation is:
(a) Roentgen *[Recent Question 2012]*
(b) Rad *[Recent Question 2013]*
(c) Rem
(d) Sievert

148. Thickness of lead apron of prevent radiation:
(a) 0.1 mm *[Recent Question 2012]*
(b) 0.2 mm
(c) 0.5 mm
(d) 1 mm

149. Maximum solar radiation in India is received by:
(a) Kerala *[Recent Question 2013]*
(b) Jammu & Kashmir
(c) Rajasthan
(d) Gujarat

150. Acceptable safe dose of radiation during pregnancy is:
(a) 1 rad *[Recent Question 2014]*
(b) 2 rads
(c) 5 rads
(d) 0.5 rads

Review Questions

151. Venturimeter is used to measure: *[Kolkata 2002]*
(a) Air velocity
(b) Size of suspended particles in the air
(c) SO_2 content in the atmosphere
(d) Bed resistance in a slow sand filter

152. Soiling index is a measure of: *[MP 2003]*
(a) Soil pollution *[Recent Question 2013, 2014, 2015]*
(b) Water pollution
(c) Noise pollution
(d) Air pollution

ENTOMOLOGY AND VECTOR CONTROL

153. Mites are the vectors of the following diseases *except*:
(a) Scabies *[AIIMS Nov 2003]*
(b) Scrub typhus
(c) Rickettsial pox
(d) Kyasanur forest disease

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154. Pyrethrum is a: *[AIIMS Dec 1991] [Recent Question 2013]*
(a) Contact poison
(b) Stomach poison
(c) Both of above: a + b
(d) Space poison

155. Match the following: Method of mosquito control Example

I. Biological control	A. Mosquito larvicidal oil [Larvivorous fish) (MLO]
II. Biological control	B. Bacillus thuringiensis (Bacteria) H14
III. Chemical control	C. Source reduction
IV. Environmental control	D. Barbados millions

(a) A-I, B-II, C-IV, D-III *[AIIMS Nov 06]*
(b) A-III, B-IV, C-II, D-I
(c) A-I, B-IV, C-II, D-III
(d) A-III, B-II, C-IV, D-I

156. Mosquitoes that breed in dirty water collection are:
(a) Anopheles *[AIIMS Dec 1995]*
(b) Culex
(c) Aedes
(d) Mansonia

157. Lice are not the vectors of: *[AIPGME 2007]*
(a) Relapsing fever *[AIIMS May 2006- 2007]*
(b) Q fever
(c) Trench fever
(d) Epidemic typhus

158. Example of cyclopropagative transmission is:
(a) Plague bacilli in rat flea *[AIPGME 2000]*
(b) Malarial parasite in mosquito
(c) Microfilaria in mosquito *[AIIMS May 1991]*
(d) Guineaworm embryo in Cyclops

159. Which of the following is incorrectly matched?
(a) Agent changes in form and number: Cyclopropagative transmission *[AIPGME 1992]*
(b) Agent merely multiples in vector, but no change in form: Propagative transmission
(c) Agent undergoes only development but no multiplication: Cyclodevelopmental transmission
(d) Agent transmitted from nymph to adult vector: Transovarial transmission

160. All of the following statements about mosquito are true *except*: *[AIIMS Nov 2004]*
(a) It is a definitive host in malaria
(b) It is a definitive host in filaria
(c) Its life cycle is completed in 3 weeks
(d) The female can travel upto 3 kilometers

161. A child has multiple itchy papular lesions on the genitalia and fingers. Similar lesions are also seen in the younger brother. Which of the following is most possible diagnosis? *[AIIMS Dec 1997]*
(a) Papular urticaria
(b) Scabies
(c) Atopic dermatitis
(d) Allergic contact dermatitis

162. Reduviid bug is a vector for the transmission of:
(a) Relapsing fever *[AIPGME 1996, PGMCET 2015]*
(b) Lyme's disease *[Recent Question 2015]*
(c) Scrub typhus
(d) Chagas' disease

163. Babesiosis is transmitted by: *[AIPGME 1995]*
(a) Tick
(b) Mites
(c) Flea
(d) Mosquito

164. Dengue fever is transmitted by: *[AIPGME 1993]*
(a) Tiger mosquito
(b) Jackal mosquito
(c) Wolf mosquito
(d) Lion mosquito

165. Which of the following flies do not bite:
(a) Sand fly *[AIIMS June 1999]*
(b) Housefly
(c) Blackfly
(d) Tse tse fly

166. Which of the following flies is found in cracks and crevices of walls during daytime: *[AIIMS May 2002]*
(a) Sand fly
(b) Housefly
(c) Blackfly
(d) Tse tse fly

167. All of the following diseases are caused by Soft Tick *except*: *[AIPGME 2008]*
(a) Tularemia *[MH 2007]*
(b) Q fever
(c) Relapsing fever
(d) KFD

168. Spot the wrongly matched pair of arthropod and disease transmitted: *[AIIMS Dec 1995]*
(a) Housefly – Poliomyelitis
(b) Louse – Epidemic typhus
(c) Itch mite – Scabies
(d) Black fly – Chagas Disease

169. Best approach to control of arthropods is:
(a) Environmental control *[AIIMS Sep 1996]*
(b) Chemical control
(c) Biological control
(d) Genetic control

170. Flight range for Aedes Mosquito is
(a) 10 meters *[AIPGME 2000]*
(b) 100 meters
(c) 400 meters
(d) 11 km

171. Normal life span of mosquitoes is: *[AIPGME 2006]*
(a) 2-3 days
(b) 5-7 days
(c) 8-34 days
(d) 3-4 months

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172. True about Paris green for mosquito control is:
(a) It is used as an anti-adult measure *[AIPGME 1999]*
(b) It is more effective against Anopheles
(c) In usual doses also it harms fish, man and domestic animals
(d) It is a nerve poison

173. Sandfly does not transmit: *[AIIMS Nov 2007]*
(a) Kala-azar
(b) Oriental sore
(c) Oraya fever
(d) Trench fever

174. Rat flea transmit following diseases *except*:
(a) Murine typhus *[AIPGME 1995]*
(b) Pneumonic plague
(c) Chiggerosis
(d) Hymenolepis dimunita

175. Drug of choice for Scabies is: *[AIIMS May 2003]*
(a) 25% Benzyl benzoate
(b) 5% Permethrin
(c) 1% HCH
(d) 5% Sulphur ointment

176. Diseases associated with rodents include all *except*:
(a) Leptospirosis *[AIIMS May 2006]*
(b) Rat Bite fever
(c) Tularemia
(d) Oriental sore

177. All of the following methods are anti-larval measures *except*: *[AIPGME 2005]*
(a) Intermittent irrigation *[AIIMS Nov 2008]*
(b) Paris green
(c) Gambusia affinis
(d) Pyrethrum

178. Scabies is transmitted by: *[DPG 2007]*
(a) Mite
(b) Tick
(c) Louse
(d) Rat flea

179. Aedes mosquito transmit the following diseases *except*:
(a) Yellow fever *[Karnataka 2008]*
(b) Dengue fever
(c) Chikungunya fever
(d) Japanese encephalitis

180. Aedes aegypti transmits following diseases:
(a) Yellow fever *[PGI 1997]*
(b) Dengue
(c) Japanese encephalitis
(d) Filriasis
(e) Malaria

181. Disease transmitted by louse include: *[PGI June 02]*
(a) Epidemic typhus *[PGI Dec 2008]*
(b) Endemic typhus
(c) Trench fever
(d) RMSF
(e) Scrub typhus

182. Organophosphate insecticides are all *except*:
(a) Dieldrin *[PGI Dec 03]*
(b) Fenthion
(c) Diazinon
(d) Propoxur
(e) Lindane

183. Aedes aegepti transmits: *[PGI June 04]*
(a) JE
(b) KFD
(c) Yellow fever
(d) Filaria
(e) Dengue

184. Vector borne diseases are: *[PGI June 04]*
(a) Syphilis
(b) Typhus
(c) Dengue
(d) J.E.
(e) HIV

185. Chikungunya is transmitted by: *[AIIMS May 2010]*
(a) Aedes
(b) Culex
(c) Mansonoides
(d) Anopheles

186. Not spread by louse: *[AIIMS May 2010]*
(a) Epidemic typhus
(b) Q fever
(c) Relapsing fever
(d) Trench fever

187. Aedes- True are A/E: *[AIIMS May 2010]*
(a) Recurrent biters
(b) Eggs can't survive >1 wk without water
(c) Transmits Dengue
(d) It takes 7-8 days to develop the parasite and transmit the disease

188. Hard tick is the vector of all the following diseases *except*: *[AIIMS Nov 2010]*
(a) Relapsing fever
(b) KFD
(c) Indian tick typhus
(d) Tularaemia

189. Which of the following is not DDT-resistant?
(a) Musca domestica *[AIPGME 2011]*
(b) Phlebotamus
(c) Culex mosquito
(d) Anopheles stephensi

190. All of the following are deliberate measures of mosquito control *except*: *[AIPGME 2011]*
(a) Use of alkaline soap water in factory
(b) Use of larvicidal agents
(c) Community participation
(d) Use of bed-nets for mosquito

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191. Vectors do not transmit infection by: *[AIPGME 2011]*
(a) Ingestion
(b) Regurgitation
(c) Rubbing
(d) Contamination with body fluids

192. Least toxic organophosphorus compound is:
(a) DDT *[DPG 2011]*
(b) Paris green
(c) Malathion
(d) Parathion

193. Which of the following statements regarding DDT is false? *[AIIMS May 2011]*
(a) Pyrethrum has synergistic action
(b) It is a contact poison
(c) Immediately kills the prey
(d) Residual effect lasts 18 months

194. Following are larval control measures *except*?
(a) DDT *[AIIMS May 2011]*
(b) Paris green *[AIIMS November 2011]*
(c) Gambusia fish
(d) Intermittent irrigation

195. Which of the following disease is transmitted globally by Anopheles, Culex and Aedes mosquitoes?
(a) Malaria *[AIPGME 2012]*
(b) Yellow fever
(c) Dengue fever
(d) Filariasis

196. Following are used for treatment of Scabies in India *except*: *[PGI November 2011]*
(a) Crotamiton lotion
(b) Sulphur ointment
(c) Tetmasol
(d) Ivermectin
(e) Rifampicin

197. Which of the following diseases is transmitted by Mansonoides mosquitoes? *[PGMCET 2015]*
(a) Japanese encephalitis
(b) West Nile fever
(c) Rift Valley fever
(d) Chikungunya fever

198. NOT a feature of Vector of Malaria:
(a) Spotted wings *[Recent Question 2015]*
(b) Siphon tube
(c) Boat shaped eggs
(d) Rest at an angle, inclined to surface of skin

199. Consider the following diseases:
1. Yellow fever
2. Q fever
3. Chikungunya fever
4. Relapsing fever
5. Japanese encephalitis
6. Sleeping sickness

Which of the above are transmitted by mosquitoes? *[UPSC CMS 2015]*
(a) 1, 2, 3, and 6
(b) 2, 3 and 5
(c) 4, 5 and 6
(d) 1, 3 and 5

200. Sanitary toilets can decrease incidence of all *except*:
(a) Diarrhoea *[JIPMER 2015]*
(b) Poliomyelitis
(c) Malaria
(d) Cholera

201. Disease transmitted by the following vector is:

(a) Japanese encephalitis *[AIIMS November 2015]*
(b) Malaria
(c) Visceral leishmaniasis
(d) Dengue

202. Which of the following viral infections is transmitted by tick? *[DNB 2007]*
(a) Japanese encephalitis
(b) Dengue fever
(c) Kyasanur forest disease (KFD)
(d) Yellow fever

203. Percentage of para-para isomer in DDT is: *[DNB 2008]*
(a) 20-30%
(b) 40-50%
(c) 60-70%
(d) 70-80%

204. Mineral oils are used in mosquito control measure as a? *[DNB 2008]*
(a) Personal protection methods
(b) Larvicide
(c) Adulticide
(d) Space spray

205. The Anopheles species most commonly found in coastal regions is? *[DNB 2008]*
(a) Anopheles philippinensis
(b) Anopheles stephensi
(c) Anopheles fluviatilis
(d) Anopheles minimums

206. Which of the following insecticide is least toxic to man and most toxic to insects? *[Bihar 2004]*
(a) Malathion
(b) Parathion

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(c) Physostigmine
(d) Nicotine

207. True about vector is: *[UP 2003]*
(a) Plague is caused by mite
(b) Sleeping sickness is caused by tse tse flies
(c) Kala-azar is caused by W. bancrafti
(d) Epidemic typhus is caused by Flea

208. DDT is: *[UP 2003]*
(a) Stomach poison
(b) Repellants
(c) Contact poisons
(d) Fumigants

209. Black fly transmits: *[MP 2001, UP 2003]*
(a) Onchocerciasis *[AP 2000]*
(b) Cysticercosis
(c) Filariasis
(d) Kala-azar

210. An example of Space Spray is: *[AP 2001]*
(a) Pyrethrum
(b) Malathion
(c) DDT
(d) Paris green

211. All are true regarding DDT, *except*: *[AP 2005]*
(a) It is primarily a contact poison
(b) It acts as neurotoxin
(c) It does not cause immediate death, but it takes several hours to kill
(d) It has repellent action on insects

212. Culex mosquito is associated with transmission of:
(a) Malaria *[AP 1978, MP 2004]*
(b) Typhus *[TN 2000]*
(c) Dengue fever
(d) Japanese encephalitis

213. The most prevalent mosquito-born viral disease in India: *[AP 1980, TN 2000]*
(a) Dengue fever
(b) Japanese 'B' encephalitis
(c) Yellow fever
(d) Kyasanur forest disease

214. DDT is a: *[TN 2005]*
(a) Organochlorine compound
(b) Organophosphorus compound
(c) Carbamate
(d) Stomach poison

215. Paris Green is used to eliminate the larva of:
(a) Anopheline *[TN 2005]*
(b) Culex *[Recent Question 2013]*
(c) Aedes
(d) Mansonoides

216. Japanese encephalitis is transmitted by:
(a) Mosquito *[Kolkata 2002]*
(b) Tick *[Recent Question 2013]*
(c) Mite
(d) Rat flea

217. All belongs to class Insecta *except*:
(a) Housefly *[Kolkata 2003]*
(b) Rat fleas
(c) Ticks
(d) Bedbugs

218. Vector of Bancroftian filariasis: *[Kolkata 2008]*
(a) Aedes
(b) Culex
(c) Mansonia
(d) Anopheles

219. True about sand flea: *[MP 2000]*
(a) Not found in India
(b) Causes ulcers in foot
(c) Causes bubo in groin
(d) Vector for Kala-azar

220. Dengue fever is transmitted by: *[MP 2001, WB 2003]*
(a) Culex
(b) Mansonia
(c) Aedes aegypti
(d) Sand fly

221. Which insecticide is used for space-spray: *[MP 2001]*
(a) Pyrethrum
(b) DDT
(c) Malathion
(d) BHC

222. Which of the followings is transmitted by ticks:
(a) H. nana *[MP 2001]*
(b) Babesiosis
(c) Loa-Loa
(d) CJ-disease

223. Mosquito borne diseases are all *except*: *[MP 2003]*
(a) KFD
(b) Malaria
(c) Filaria
(d) Dengue fever

224. Natural insecticide among following is: *[MP 2004]*
(a) Malathion
(b) Pyrethrum
(c) Aldrin
(d) BHC

225. Culex is the vector for: *[MP 2004]*
(a) Filaria
(b) JE
(c) Dengue
(d) Yellow fever

226. Which of the following diseases is transmitted by soft tick? *[MP 2008]*
(a) Tularemia
(b) Q fever
(c) Colorado tick fever
(d) Human babesiosis

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227. Which of the following is "nuisance mosquito"?
(a) Anopheles *[MH 2005]*
(b) Culex
(c) Aedes
(d) Mansonoides

228. Mosquitoes whose larvae lie horizontal on water and thus rest parallel to surface of water: *[MH 2006]*
(a) Aedes
(b) Anopheles
(c) Culex
(d) Mansonides

229. The nerve gas 'sarin' is: *[MH 2007]*
(a) Organophosphorous compound
(b) Organchloro compound
(c) Carbamate
(d) Acridine

230. Which of the following mosquito transmit Japanese encephalitis? *[MH 2008]*
(a) Culex
(b) Aedes
(c) Mansonides
(d) All of the above

231. Which of the following type of mosquitoe can be controlled by removing and destroying the aquatic plants by herbicides? *[MH 2008]*
(a) Aedes
(b) Culex
(c) Mansonia
(d) Anopheles

232. KFD is transmitted by: *[RJ 2003]*
(a) Tick
(b) Mite
(c) Sand Flea
(d) Mosquito

233. Scrub typhus is transmitted by: *[RJ 2003]*
(a) Mite *[Recent Question 2013]*
(b) Tick
(c) Flea
(d) Louse

234. Ades aegypti index for control of yellow fever should be less then: *[RJ 2004]*
(a) 1
(b) 2
(c) 3
(d) 5

235. All are true about Pyrethrum *except*: *[RJ 2009]*
(a) Residual action is similar to DDT
(b) Vegetable origin
(c) Contact poison
(d) Synergistic with DDT

236. Most hazardous pesticide colour coding is:
(a) Red *[AIIMS PGMEE November 2013]*
(b) Green
(c) Yellow
(d) Black

237. Louse transmitted disease(s) is/are: *[PGI November 2012]*
(a) Trench fever
(b) Q fever
(c) KFD
(d) Epidemic typhus
(e) Pediculosis

238. Disease(s) spread by ticks include: *[PGI May 2012]*
(a) Epidemic typhus
(b) Endemic typhus
(c) Scrub typhus
(d) RMSF
(e) Crimean Congo Fever

239. Cyclo-propogative cycle is:
(a) Malaria *[DNB June 2011] [DNB December 2011]*
(b) Plague
(c) Cholera
(d) Filarial

240. Plague undergoes: *[DNB December 2011]*
(a) Trans-ovarian cycle
(b) Propogative cycle
(c) Cyclo-developmental
(d) Cyclo-propogative

241. Phlebotamus argentipes is killed by:
(a) Pyrethrum *[DNB December 2011]*
(b) DDT *[Recent Question 2012]*
(c) Malathion *[Recent Question 2013]*
(d) None of the above

242. Mode of transmission of Q fever: *[DNB 2008]*
(a) Ticks
(b) Mites
(c) Louse
(d) Mosquito

243. Urban malaria is transmitted by? *[Recent Question 2013]*
(a) Anopheles culicifacies
(b) Anopheles stephensi
(c) Anopheles fluviatilis
(d) Anopheles minimus

244. Disease transmitted by Hard tick include all *except*:
(a) Viral encephalitis *[DNB December 2011]*
(b) Oriental sore
(c) Tick paralysis
(d) Tularaemia

245. Mineral oils are used in mosquito control measure as a:
(a) Personal protection methods *[DNB 2008]*
(b) Larvicide
(c) Adulticide
(d) Space spray

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246. The anopheles species most commonly found in coastal regions is: *[DNB 2008]*
(a) Anopheles philippinesis
(b) Anopheles stephensi
(c) Anopheles fluviatilis
(d) Anopheles minimus

247. Range of flight of Aedes mosquito is?
(a) 1 km *[Recent Question 2013]*
(b) Less than 100 m
(c) 400 m
(d) 10 km

248. The distance from airport or seaport which has to be kept free from aedes mosquitoes is:
(a) 400 m *[Recent Question 2013]*
(b) 500 m
(c) 1 km
(d) 100 m

249. Transovarian transmission is seen in:
(a) Rickettesial disease *[Recent Question 2013]*
(b) Malaria
(c) Filariasis
(d) None

250. Cyclodevelopmental stage is seen in:
(a) Malaria *[Recent Question 2012]*
(b) Filaria *[Recent Question 2013]*
(c) Plague
(d) Cholera

251. Fenthion is: *[Recent Question 2013]*
(a) Space spray
(b) Residual spray
(c) Stomach poison
(d) Fumigant

252. Transovarian transmission is seen in:
(a) Ticks *[Recent Question 2013]*
(b) Louse
(c) Flea
(d) None

253. Best way to control houseflies: *[Recent Question 2013]*
(a) Eliminate breeding places
(b) Insecticide spray
(c) BedNet use
(d) Paris green

254. Sandfly can fly upto …….. *[Recent Question 2012]*
(a) 50 yards
(b) 100 yards
(c) 200 yards
(d) 300 yards

255. Number of holes per square inch of a standard mosquito net is: *[DNB December 2009]*
(a) 100
(b) 150
(c) 250
(d) 175

256. Regarding anopheles mosquito true is all *except*:
(a) Eggs are laid singly on water *[DNB June 2010]*
(b) Larva don't have siphon tube
(c) Wings are spotted
(d) Pupa don't have siphon tube

257. Which of the following viral infections is transmitted by tick? *[DNB 2007]*
(a) Japanese encephalitis
(b) Dengue fever
(c) Kyasanur forest disease
(d) Yellow fever

258. Percentage of para-para isomer in DDT is: *[DNB 2008]*
(a) 20-30%
(b) 40-50%
(c) 60-70%
(d) 70-80%

259. Average number of mites found on the body in a person suffering from scabies is: *[DNB June 2011]*
(a) 1-2
(b) 5-10
(c) 10-15
(d) 15-20

260. Mosquito-net hole diameter is: *[Recent Question 2012]*
(a) 0.02 inch
(b) 0.0475 inch
(c) 0.5 inch
(d) 0.9 inch

261. Ixodes ticks transmit: *[Recent Question 2012]*
(a) Babesiosis
(b) Tularaemia
(c) Lyme's disease
(d) KFD

262. Disease(s) transmitted by Aedes aegypti include:
(a) Yellow fever *[PGI November 2013]*
(b) Dengue
(c) Chikungunya fever
(d) West Nile fever
(e) Rift valley fever

263. Disease(s) transmitted by Louse include:
(a) Epidemic typhus *[PGI November 2013]*
(b) Scrub typhus
(c) Relapsing fever
(d) Trench fever
(e) Q fever

264. Features of Anopheles mosquito include:
(a) Stripes on wings *[PGI May 2014]*
(b) Larva rests at an angle to water surface
(c) Adult rests at angle to surface of skin
(d) Eggs laid in clusters
(e) No siphon tube in larvae

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265. Mansonia mosquito is a vector of all of the following diseases *except*: *[JIPMER 2014]*
(a) Malaria
(b) Brugian filariasis
(c) Chikungunya fever
(d) St. Louis Encephalitis

266. Cigar-shaped eggs are seen in: *[Recent Question 2014]*
(a) Culex
(b) Aedes
(c) Anopheles
(d) Mansonia

267. Most efficient anti-larval measure to prevent urban malaria is: *[AIIMS November 2014]*
(a) Clean drainage and sewerage systems
(b) Cover overhead tanks properly
(c) Filling cesspools and ditches
(d) Cover pits

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EXPLANATIONS

WATER

1. **Ans. (b) Rain water** *[Ref. Park 23/e p707]*
   - *Rain:*
     - Is the prime source of all water
     - Is the 'purest form of water in nature'
     - Chemically, it is very soft water: contains traces (0.0005%) of solids
     - Gibraltar depends on rain water as a source of supply

Also Remember

- *Safe and wholesome water:* has been defined as water that is
  - Free from pathogenic agents
  - Free from harmful chemical substances
  - Pleasant to taste (free from colour and odour)
  - Usable for domestic purposes
- Water is said to be 'polluted' or 'contaminated' if it does not fulfill above criteria
- *Safe yield of water:* Yield that is adequate for 95% of the year.

2. **Ans. (c) 1 ppm free chlorine should be present in water after break point has reached** *[Ref. Park 23/e p714-715]*

CHLORINATION OF WATER

- *Disinfecting action of chlorine in water is due to:*
  - Hypochlorous acid (HOCl) – Main role in disinfection
  - Hypochlorite ions (OCl) – Minor role in disinfection
- *Chlorine has residual germicidal effect (and not Ozone or UV rays):* Provides a margin of safety against subsequent microbial contamination, as may occur during storage and distribution
- *Phases of Chlorination:*
  - Phase I: Formation of chloramines
  - Phase II: Destruction of chloramines
  - Phase III: Appearance of break-point
  - Phase IV: Accumulation of free residual chlorine
- *Recommended contact period of free residual chlorine in water:* 1 hour
- *Level of free residual chlorine (FRC) recommended:*

Water type	Recommended	
	Residual chlorine level*	Contact period
Drinking water	> 0.5 mg per litre (ppm)	1 hour
Water bodies, post disaster	> 0.7 mg per litre (ppm)	1 hour
Swimming pool sanitation	> 1.0 mg per litre (ppm)	1 hour

*(1 mg per litre = 1 ppm)

- *Correct dose of chlorine to be applied:* Chlorine demand + FRC 0.5 mg per litre.

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Also Remember

- *Bleaching powder (CaOCl2)contains:* 33% available chlorine
- *Chlorine acts best as a disinfectant for water at:* pH around 7.0
- *Instruments used in chlorination of water:*

Instrument	Utility
Horrock's Apparatus	Chlorine demand estimation
Chlorinator/Chloronome	Mixing or regulating dose of chlorine
Chloroscope	Measuring residual level of chlorine

- *Tests for chlorination of water:*
  - *Ortho-toulidine (OT) Test:* Measure the levels of,
    1. Free chlorine
    2. Free & Combined chlorine
  - *Ortho-toulidine Arsenite (OTA) Test:* Measure the levels of,
    1. Free chlorine
    2. Combined chlorine
- *OTA test is better than OT test as:*
  - Detects both free and combined chlorine separately
  - Not affected by interfering substances (nitrites, iron, manganese).

3. Ans. (d) 45 mg/l *[Ref. Park 23/e p723]*

- *Guideline value of nitrate in drinking water:* < 50 mg/litre
  - Nitrates in drinking water indicate: Remote contamination
  - Is solely used for prevention of methemoglobinemia
- *Guideline value of nitrite in drinking water:* < 3 mg/litre
  - Nitrites in drinking water indicate: Recent contamination
  - May lead to 'Blue baby syndrome'
- Concentration of nitrate/Guideline value of nitrate + Concentration of nitrite/Guideline value of nitrite should be ≤ 1

4. Ans. (c) Cl. Tetani *[Ref. Park 23/e p720-721]*

- *Bacteriological indicators of water quality:*
  - Coliforms (E.coli is most important microbiological indicator)
  - Fecal streptococci (Indicator of recent contamination) (Sodium Azide medium)
  - Clostridium perfringens (Indicator of remote contamination)
- *Acceptable level of coliforms in drinking water:* None
  - EXCEPTION: In large urban supplies, up to 5% samples are acceptable to be contaminated, if taken continuously for a period of 12 month

5. Ans. (d) 150-200 lit *[Ref. Park 23/e p724]*

- *Water supply considered adequate to meet the need for domestic purposes:*
  - *Urban:* 150-200 litres per capita per day
  - *Rural:* 40-60 litres per capita per day
- *Daily drinking water requirement:* 2-3 litres per capita per day.

Also Remember

- *Criteria for identification of 'Problem Habitations':*
  - *Not Covered (NC)/No Safe Source (NSS) Habitations:*
    1. Drinking water source point is not within 1.6 kms in plains or 100 m elevation in hilly areas
    2. Water source affected with quality problems like excess salinity, iron, fluoride, arsenic, or other toxic materials or biologically contaminated
    3. Quantum of availability of safe water is not enough to meet drinking and cooking needs
  - *Partially Covered (PC) Habitations:*
    1. Drinking water source point is within 1.6 km in plains or 100 m elevation in hilly areas
    2. Capacity of system is 10 – 40 lpcd
  - *Fully Covered (FC) Habitations:* include all the remaining habitations.

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6. **Ans. (a) No coliform** *[Ref. Park 23/e p720-721]*
Refer to Ans 4.

7. **Ans. (c) Calcium & magnesium bicarbonates** *[Ref. Park 23/e p726-727]*

HARDNESS OF WATER

- Hardness of water is defined as the 'soap destroying power of water'
- *Hardness of water is of two types:*

Type of hardness	Underlying causes
Temporary hardness (Carbonate hardness)	Calcium & Magnesium salts of Bicarbonates
Permanent hardness (Non- Carbonate hardness)	Calcium & Magnesium salts of Sulfates/Chlorides/Nitrates

- *Hardness of water is expressed in terms of:* milliequivalents per litre (meq/lt) of Calcium Carbonate ($CaCO_3$)
  - 1 meq/lt hardness = 50 mg $CaCO_3$ (50 ppm) per litre of water
- *Classification of hardness in water:*

Classification	Level of Hardness (mq/litre)
Soft water	< 1 (< 50 mg/l)
Moderately Hard water	1 – 3 (50 – 150 mg/l)
Hard water	3 – 6 (150 – 300 mg/l)
Very Hard water	> 6 (> 300 mg/l)
	Softening of water is recommended at level of hardness > 3 meq/ litre (>150 mg/ litre of Calcium carbonate)

8. **Ans. (d) Chlorine demand** *[Ref. Park 23/e p717-718]*

HORROCK'S APPARATUS

- *Use:* To find out the dose of bleaching powder required for disinfection of water, i.e. 'Chlorine demand estimation of water'
- *Dose of bleaching powder required (Chlorine demand):*
  - n × 2 gm to disinfect 455 litres of water (where n = no. of first cup which shows distinct blue colour).

9. **Ans. (b) Horrock's apparatus** *[Ref. Park 23/e p717-718]*
- *Chlorine demand of water:* Is the amount of chlorine that is needed to destroy bacteria, and to oxidize all the organic matter amd ammoniacal substances present in water
  - Is the amount of chlorine added to water minus amount of residual chlorine remaining at the end of a specific period of contact (1 hr)
  - Estimation of chlorine demand of water (or dose of bleaching powder required for disinfection of water) is done by 'Horrock's apparatus'.

10. **Ans. (c) Free and combined chlorine in water** *[Ref. Park 23/e p714-715]*

11. **Ans. (b) 5-10°C** *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p31]*
- Most desired temperature range for drinking water is 40 – 50° F (5-10°C).

12. **Ans. (d) Lead** *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p72]*
- *Undesirable metals in drinking water:* Iron, manganese, zinc, copper, aluminium, lead
- *MOST undesirable metal in drinking water:* Lead
  - Lead was earlier seen in drinking water when water was being supplied through lead pipes
- *Undesirable salts in drinking water:* Chlorides, Fluorides, Nitrites, Nitrates, Calcium, Magnesium
- *Undesirable gases in drinking water:* Ammonia, Hydrogen sulphide, Methane.

13. **Ans. (a) Coliform bacteria** *[Ref. K. Park 23/e p720-721]*
- *Coliform organisms:*
  - Primary & most reliable bacterial indicator for water quality
  - E. coli is most important coliform indicator
  - Reasons for choosing coliforms as indicators of fecal pollution rather than water – Borne. pathogens:
    1. Constant presence in great abundance in human intestine; foreign to potable waters
    2. Easily detectable by culture methods
    3. Longer survival period
    4. Greater resistance to forces of natural purification.

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14. Ans. (b) Water washed disease *[Ref. A Dictionary of Public Health by Dr. J. Kishore; p575-76,]*

- *Water washed diseases:* Include infections of the outer body surface which occur due to inadequate use of water or improper hygiene. Examples: Scabies, Trachoma, Typhus, Bacillary dysentery, Amoebic dysentery

Also Remember

- *Scabies:* Is a transmissible ectoparasite skin infection characterized by superficial burrows, intense pruritus (itching) and secondary infection
  - Scabies is caused by the mite Sarcoptes scabei, variety hominis (known as 'Itch mite')
  - Scabies is usually transmitted by close contact with an infested person; Scabies is transmitted readily, often throughout an entire household, by skin-to-skin contact with an infected person and thus is sometimes classified as a sexually transmitted disease (STD)
  - Drug of Choice for scabies: 5% Permethrin (Oral systemic DOC: Ivermectin)
  - Scabies was the first disease of man with known cause.

15. Ans. (d) 150-200 litres per capita *[Ref. Park 23/e p724]*

Also Remember

- *Norms of water supply for urban areas:*

Type of urban area	Norm for water supply
Towns with piped water supply, but no sewerage system	70 lpcd
Cities with piped water supply & existing/planned sewerage	135 lpcd
Metropolitan & Megacities with piped water supply & sewerage	150 lpcd
Public stand post	40 lpcd

(lpcd: Litres per capita per day)

16. Ans. (c) Typhoid *[Ref. A Dictionary of Public Health by Dr. J. Kishore; p575-76]*

17. Ans. (c) Frequent washing is not required *[Ref. Park 23/e p713]*

- *Comparison of Rapid and Slow sand filters:*

	Rapid Sand Filter	Slow Sand Filter
Space	Occupies very little space	Occupies large area
Rate of filtration	200 m.g.a.d.	2 – 3 m.g.a.d.
Effective size of sand	0.4 – 0.7 mm	0.2 – 0.3 mm
Preliminary treatment	Chemical coagulation & sedimentation	Plain sedimentation
Washing	By back-washing	By scraping sand bed
Frequent washing	Required	Not required
Mechanism of action	Essentially physical	Both physical & mechanical
Operation	Highly skilled	Less skilled
Loss of head allowed	6 – 8 feet	4 feet
Removal of turbidity	Good	Good
Removal of colour	Good	Fair
Removal of bacteria	98 – 99 percent	99.9 – 99.99 percent
Suitability	For big cities	For small towns

Also Remember

- *Vital layer (Schmutzdecke, Zoogleal layer or Biological layer):* Slimy, gelatinous layer consisting of algae, planktons, diatoms and bacteria is formed in the slow sand filter
  - Vital layer is the *'Heart of Slow Sand Filter'*
  - Formation of vital layer is known as *'Ripening of the filter'*
  - It removes organic matter, holds back bacteria oxidizes nitrogen to nitrates and helps in yielding bacteria-free water.

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18. **Ans. (b) Hypochlorous acid** *[Ref. Park 23/e p714-715]*

19. **Ans. (a) Chlorine only** *[Ref. Park 23/e p714-715]*
    - Ozone gas and UV radiation has got no residual action.
    - Free Residual Chlorine (FRC) is allowed to accumulate in water till it reaches a level of 0.5 ppm (mg/litre) when it becomes fit for community supply.
    - FRC has a bactericidal action that takes care of post-chlorination contamination of drinking water.

Also Remember

Chlorine has no effect on bacterial spores, protozoal cysts and helminthic ova (except in higher doses). Viral agents of Infectious hepatitis (Hepatitis A) and Poliomyelitis are also resistant in normal doses, as are cyclops.

20. **Ans. (a) Gross a activity 0.1 Bq/L & Gross b activity 1.0 Bq/L (Now 0.5 Bq/L and 1.0 Bq/L respectively)** *[Ref. Park 23/e p725]*
    - *Key guideline aspects of WHO recommended drinking water quality:*
      - Colour < 15 true colour units (TCU)
      - Turbidity < 1 nephlometric turbidity units (NTU)
      - pH: 6.5 – 8.5
      - Total dissolved solids (TDS) < 1000 mg/litre
      - Zero pathogenic microorganisms
      - Zero infectious viruses
      - Absence of pathogenic protozoa and infective stages of helminthes
      - Fluorine < 1.5 ppm (0.5 – 0.8 ppm: Optimum level)
      - Nitrates < 50 mg/litre
      - Nitrites < 3 mg/litre
      - Gross alpha radiological activity < 0.5 Bq/litre (New Guideline — WHO)
      - Gross beta radiological activity < 1.0 Bq/litre (New Guideline — WHO).

21. **Ans. (a) Detect the presence of Coliform organisms in a sample of water** *[Ref. Park 23/e p726]*

Also Remember

- *Periodicity of water sample collection for bacteriological examination:*

Population served	Minimum interval between successive samples
< 20,000	1 month
20,001 – 50,000	2 weeks
50,001 – 100,000	4 days
> 100,000	1 day

22. **Ans. (a) Less than 1** *[Ref. Park 23/e p726-727]*
    - *Methods of removal of hardness of water:*

Type of hardness	Methods of removal
Temporary hardness	Boiling
	Addition of lime
	Addition of sodium carbonate
	Permutit process
Permanent hardness	Addition of sodium carbonate
	Base exchange process

    - WHO says that 'there does not appear to be any convincing evidence that water hardness causes adverse health effects in humans' (rather it is cardioprotective).

23. **Ans. (c) Horrock's apparatus** *[Ref. Park 23/e p717-718]*

24. **Ans. (b) Starch iodide** *[Ref. Park 23/e p717]*
    - *Indicator in Horrock's apparatus:* Starch iodide
    - *Indicator in Presumptive coliform test (MPN Multiple Tube Method):* Bromocresol purple

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25. **Ans. (a) 0.5 mg/l for a contact period of 1 hr** *[Ref. Park 23/e p715]*
26. **Ans. (b) Chlorine acts best when pH is around 7** *[Ref. Park 23/e p714]*
27. **Ans. (c) 8 g** *[Ref.Park 23/e p717-718]*
28. **Ans. (a) Bicarbonates of calcium and magnesium** *[Ref. Park 23/e p726-727]*
29. **Ans. (b) Hard water** *[Ref. Park 23/e p727]*
30. **Ans. (a) Bacteria are removed more effectively; (c) Cost construction is cheaper; (d); (e)** *[Ref. Park 23/e p711-714]*
31. **Ans. (a) E. coli; (b) Coliform; (c) Enterococci** *[Ref. Park 23/e p720-721]*
32. **Ans. (a) Staphylococcus** *[Ref. K. Park 23/e p720-721]*
33. **Ans. (a) Presence of Clostridial spores indicates recent contamination of water** *[Ref. K. Park 23/e p721]*
34. **Ans. (a) Presence of clostridial spores indicate recent contamination** *[Ref. Park 23/e p721]*
35. **Ans. (b) Vital layer** *[Ref. K. Park 21/e p661, Park 23/e p712]*
36. **Ans. (c) Requires longer duration** *[Ref. K Park 23/e p711-712]*
37. **Ans. (b) Water contamination** *[Ref. K Park 23/e p720-721]*
38. **Ans. (d) 150 mg/litre** *[Ref. K Park 23/e p726-727]*
39. **Ans. (c) Zoological layer** *[Ref. K Park 23/e p712]*
40. **Ans. (d) 0.5 mg/L** *[Ref. K Park 23/e p717-718]*
41. **Ans. (a) Nalgonda technique** *[Ref. K Park 23/e p644]*
42. **Ans. (a) Colour <15 TCU; (b) pH 6.5 – 8.5; (c) Chlorides 200-600 mg/l; (e) Zinc <4 mg/l** *[Ref. K Park 23/e p719-720]*
43. **Ans. (c) 1-3** *[Ref. K Park 23/e p726-727]*
44. **Ans. (b) E. coli** *[Ref. K Park 23/e p720-721]*
45. **Ans. (a) Lime + Alum** *[Ref. K Park 23/e p644]*
46. **Ans. (d) 200 mg/L** *[Ref. K Park 23/e p719]*
47. **Ans. (a) 0.5 mg/L** *[Ref. K Park 23/e p717-718]*
48. **Ans. (d) Faecal streptococci** *[Ref. K Park 23/e p720-721]*
49. **Ans. (a) Eijkman test** *[Ref. K Park 22/e p674]*
50. **Ans. (a) Free from pathogens; (b) Free from harmful chemicals; (d) Free from colour and odour** *[Ref. Park 23/e p719]*
51. **Ans. (c) Super chlorination followed by dechlorination** *[Ref. Park 23/e p714]*
52. **Ans. (b) 0.5 mg/L** *[Ref. WHO Factsheet Chlorine Monitoring, Factsheet/ 2.30 p176]*

    RECOMMENDED RESIDUAL CHLORINE LEVELS POST-EPIDEMIC
    - At all points in a Piped supply: 0.5 mg/L
    - At standpoints and Wells: 1.0 mg/L
    - At tanker trucks (at filling): 2.0 mg/L
53. **Ans. (b) Nitrites** *[Ref. Park 23/e p671-72]*

Review Questions

54. **Ans. (d) Decreased soap consumption** *[Ref. Park 23/e p726-727]*
55. **Ans. (a) 33% chlorine** *[Ref. Park 23/e p716]*
56. **Ans. (d) Brucellosis** *[Ref. Park 23/e p710]*
57. **Ans. (a) No coliform bacteria in water** *[Ref. Park 23/e p720-721]*
58. **Ans. (d) Dissolved nitrogen** *[Ref. Park 21/e p664-66, Park 22/e p667, 669]*
59. **Ans. (d) 600 mg/litre** *[Ref. Park 23/e p719]*

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60. **Ans. (a) Free chlorine** *[Ref. Park 23/e p714-715]*
61. **Ans. (b) On the sand bed** *[Ref. Park 23/e p712]*
62. **Ans. (b) 1 hr** *[Ref. Park 23/e p715]*
63. **Ans. (b) 0.5 mm** *[Ref. Park 23/e p713]*
64. **Ans. (c) 90%** *[Ref. Park 23/e p713]*
65. **Ans. (a) Schmutzdecke** *[Ref. Park 23/e p711]*
66. **Ans. (c) Chlorination of water** *[Ref. Park 23/e p714]*
67. **Ans. (a) pH 6.5-8.5** *[Ref. Park 23/e p720]*
68. **Ans. (d)** *[Ref. Park 23/e p712]*
69. **Ans. (d) 30 gm** *[Ref. Park 23/e p717-718]*
70. **Ans. (b) 20 liters** *[Ref. Park 23/e p717]*
71. **Ans. (d) No residual action** *[Ref. Park 23/e p715]*
72. **Ans (d) Risk of Guinea worm infection** *[Ref. Park 22/e p347]*
73. **Ans. (a) 50-150** *[Ref. Park 21/e p672, Park 22/e p675]*

AIR

74. **Ans. (a) Humidity** *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p54-56, Park 23/e p749]*

AIR HUMIDITY

- Air humidity is moisture content of air
- *Air humidity can be measured by:*
  - Dry and wet bulb thermometers
  - Hygrometer
  - Sling/Whirling Psychrometer
  - Assman Psychrometer

Also Refer to Annexure 3

75. **Ans. (a) Perflation and Aspiration** *[Ref. Park 23/e p738-739]*
- *Types of ventilation:*
  - *Natural ventilation:*
    1. *Wind:* It blows through a room (Perflation) and may exert a suction at its tail end (Aspiration)
    2. *Diffusion:* When passes through smallest openings
    3. *Inequality of temperature*
  - *Mechanical (artificial) ventilation:*
    1. *Exhaust ventilation:* Air is extracted to outside by exhaust fans driven by electricity
    2. *Plenum ventilation:* Fresh air is blown into rooms by centrifugal rooms
    3. *Balanced ventilation:* Combination of exhaust and plenum ventilation
    4. *Air conditioning:* Simultaneous control of all factors especially temperature, humidity and air movement

76. **Ans. (b) McArdle's index** *[Ref. Park 23/e p734-735]*
- *Air pollutants can be of several types:*
  - *Primary pollutants:* are emitted directly (SO_2, NO_2, CO, Hydrocarbons, Particulate matter, CFCs, Ammonia, Radioactive materials, Metals like lead, cadmium, copper)
  - *Secondary pollutants:* are formed by interaction between primary pollutants (Ground level ozone, Peroxyacetyl nitrate, Particulate matter formed from primary pollutants)
- *Chemical indicators of air pollution:*
  - *Sulphur dioxide:* Best indicator of air pollution
  - *Smoke or Soiling index:* Air strain on a filter paper measured through photoelectric meter
  - Grit & dust measurement
  - Coefficient of haze
  - Air pollution index
- *BEST Biological indicator of air pollution:* Lichens.

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Also Remember

- *Corrected Effective Temperature (CET) is an index of thermal comfort:* Combines effect of temperature, humidity, velocity of air & mean radiant heat
  - *Mc Ardle's maximum allowable sweat rate:* 4.5 litres/4h

Zone of comfort	P4SR (Predictable 4 hour sweat rate)
Comfort zone	1 – 3 litres
Just tolerable	3 – 4.5 litres
Intolerable	> 4.5 litres

- *The Kyoto protocol:* is a protocol intended to achieve 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'
  - The protocol was initially adopted for use on 11 December 1997 in Kyoto, Japan and which entered into force on 16 February 2005
  - The Kyoto Protocol establishes legally binding commitments for the reduction of 6 greenhouse gases (carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons) by industrialized nations, as well as general commitments for all member countries
  - Under Kyoto, industrialized countries agreed to reduce their collective GHG emissions by 5.2%, averaged over the period of 2008-2012, compared to the year 1990.

77. Ans. (c) 4.5 lit/ 4 hours *[Ref. Park 23/e p732]*

Also Remember

- *Indices of thermal comfort:*
  - Air temperature
  - Air temperature & humidity
  - *Cooling power:* Air temperature, humidity & air movement
  - *Effective Temperature (ET):* Combines effect of temperature, humidity & movement of internal air on sensation of warmth or cold felt by the human body. It ignores effects of radiation from the surrounding structures
  - *Corrected Effective Temperature (CET):* Combines effect of temperature, humidity, velocity of air & mean radiant heat.

78. Ans. (c) Air temperature, humidity and air movement *[Ref. Park 23/e p732]*

- *Kata thermometer measures 'cooling power of air':* Cooling power of air comprises of
  - Air temperature
  - Humidity
  - Air movement
- *Kata thermometer readings as indices of thermal comfort:*
  - Dry kata reading > 6 (Thermal comfort)
  - Wet kata reading > 20 (Thermal comfort)
- *Nowadays it is used to record low air velocity.*

79. Ans. (a) Kata thermometer [Nowadays its only used to meaure low air velocity] *[Ref. Park 23/e p732, 747]*

80. Ans. (d) Plenum ventilation *[Ref. Park 23/e p739]*

81. Ans. (d) Globe thermometer *[Ref. Park 23/e p732]*

- *Instruments used in Air temperature:*

Instrument	Measures
Dry bulb thermometer	Air temperature
Wet bulb thermometer	Air temperature
Maximum thermometer	Air temperature
Minimum thermometer	Air temperature

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Six's maximum and minimum thermometer	Air temperature
Silvered thermometer	Air temperature
Globe thermometer	Mean radiant temperature
Wet Globe thermometer	Environmental heat
Kata thermometer	Cooling power of Air; Low air velocities

82. Ans. (b) Kata thermometer *[Park 23/e p732, 747]*

83. Ans. (a) CO_2 is a major greenhouse gas *[Ref. Wikipedia]*

GREENHOUSE GASES

- Water vapour (Highest contribution)
- Carbondioxide (Second highest contribution)
- Methane
- Ozone
  - Ozone layer: Is beneficial as it cuts down UV transmission
- CFCs depletes ozone layer

84. Ans. (d) Mercury vapour *[Ref. K. Park 23/e p735-736]*

Sources of Indoor Air Pollution: **(Mnemonic: C MORON SCARF)**

Indoor air pollutant	Sources
Respirable particles	Tobacco smoke, Stove, Aerosols
Carbon monoxide	Combustion equipment, Stove, Gas heaters
Nitrogen dioxide	Gas cookers, Cigarettes
Sulphur dioxide	Coal combustion
Carbon dioxide	Combustion, Respiration
Formaldehyde	Particle board, Carpet adhesives, Insulation
Organic vapours (benzene, toulidine)	Solvents, Adhesives, Resins, Aerosols
Ozone	Electric arcing, UV light
Radon & daughters	Building materials
Asbestos	Insulation, Fire-proofing
Mineral fibres	Appliances

Review Question

85. Ans. (d) Neuro-developmental problems *[Ref. K Park 23/e p735-736]*

Effects of indoor air pollution

- Acute respiratory tract infections (Pneumonias)
- Chronic lung disease
- Lung cancers in adults
- Adverse pregnancy outcomes (Especially stillbirths)

86. Ans. (d) CFCs *[Ref. Global Change of Planet Earth OECD, p48]*

87. Ans. (a) SO_2 *[Ref. K Park 23/e p734]*

88. Ans. (a) Corrected effective temperature 77-80°F *[Ref. K Park 23/e p732]*

89. Ans. (c) Anemometer *[Ref. K Park 22/e p695]*

90. Ans. (d) Central Pollution Control Board *[Ref. K Park 23/e p737]*

91. Ans. (c) Temperature inversion *[Ref. Encyclopedia of Climate and Weather by Schneider, Root & Mastrandrea, 2/e (Volume 3) p392]*

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92. Ans. (b) 40 – 60 *[Ref. Park 23/e p747]*

Heat Stress Index (HSI)	
HSI %	**Consequence of 8 hour exposure**
0	No thermal strain
10-30	Mild-Moderate heat stress, Minimal impairment in work
40-60	Severe heat stress, Threat to health if not fit
70-90	Very severe heat stress, only few can sustain it
100	Maximum heat stress, only young fit acclimatized can sustain it
>100	Varying degress of stress due to hyperthermia

93. Ans. (d) Numbness *[Ref. Park 23/e p747-748]*

EFFECTS OF HEAT STRESS

- Heat stroke: Body temperature >110°F, Delirium, Convulsions, Absence of sweating
- Heat hyperpyrexia
- Heat exhaustion
- Heat cramps
- Heat syncope

Review Question

94. Ans (a) 2 – 3 *[Ref. Park 21/e p681, Park 22/e p685]*

95. Ans (c) 4 – 6 *[Ref. Park 21/e p681, Park 22/e p685]*

96. Ans. (a) 79°F *[Ref. Park 23/e p732]*

97. Ans. (d) All of the above *[Ref. Park 23/e p735-736]*

98. Ans. (a) Air velocity *[Ref. Park 23/e p732]*

99. Ans. (c) Kiffer test *[Ref. Internet]*

100. Ans. (c) Sling psychrometer *[Ref. Park 23/e p749]*

SOUND

101. Ans. (a) 20-30 dB *[Ref. K. Park 23/e p742]*

- *Human ear is sensitive to sound frequency:* 20 – 20,000 Hz
- Daily maximum tolerable sound level to human ear (without substantial damage to their hearing): 85 – 90 dB
  - *Auditory fatigue appears in:* 90 dB region (greatest at 4000 Hz)
- *Sound level above which tympanic membrane rupture (permanent mechanical damage):* 150 – 160 dB
- *Sound levels of some noises:*
  - Whisper: 20 – 30 dB
  - Normal conversation: 60 – 70 dB
  - Mechanical damage: 150 – 160 dB (e.g Jet taking off)
- *Acceptable noise levels:* expressed in dB (A), sound pressure levels conforming to weighting curve (A)

Environment	Place	Acceptable noise level dB (A)
Residential	Bed room	25
	Living room	40
Commercial	Office	35 – 45
	Conference	40 – 45
	Restaurants	40 – 60
Industrial	Workshop	40 – 60
	Laboratory	40 – 50
Educational	Class room	30 – 40
	Library	35 – 40
Hospitals	Wards	20 – 35

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Also Remember

- 20th century has been described as 'Century of noise'
- *Basic instruments used in studies of noise:*

Instrument	Use
Sound Level Meter	Measures intensity of sound in dB or dB(A)
Octave Band Frequency Analyser	Shows 'sound spectrum', characteristic (pitch)
Audiometer	Measures hearing ability

- *Most Temporary Hearing loss occurs in the frequency range:* 4000-6000 Hz.

102. Ans. (c) 160 dB *[Ref. Park 23/e p742]*

103. Ans. (c) 85 db *[Ref. Park 23/e p742]*

104. Ans. (c) 100 dB *[Ref. K Park 23/e p742]*

Review Questions

105. Ans. (c) 85 dB *[Ref. Park 23/e p742]*

106. Ans. (a) 85 dB *[Ref. Park 23/e p741-742]*

107. Ans. (c) 140 dB *[Ref. Park 23/e p741-742]*

108. Ans. (b) 85 dB *[Ref. Park 23/e p741-742]*

109. Ans. (d) 100 dB *[Ref. Park 23/e p741-742]*

110. Ans. (c) 85 dB *[Ref. Park 23/e p741]*

111. Ans. (b) 85 *[Ref. Park 23/e p741]*

LIGHT

112. Ans. (a) 6-12 *[Ref. Park 23/e p739]*

- *Basic minimum illumination for satisfactory vision:* 15 – 20 foot candles

113. Ans. (a) 8% *[Ref. K Park 23/e p740]*

HOUSING

114. Ans. (a) 50—100 sq.ft. *[Ref. Park 23/e p752]*

- *Recommend per capita space in urban houses:* 50-100 sq-ft.

Also Remember

- *Accepted standards of overcrowding:*
  - *Persons per room:*

No. of rooms	Maximum no. of persons
1 room	2 persons
2 rooms	3 persons
3 rooms	5 persons
4 rooms	7 persons
5 rooms (additional 2 for each further room)	10 persons

Contd...

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Contd...

- *Floor space per person:* Child between 1 – 10 years is counted as ½ unit; infant is not counted

Floor space	Maximum no. of persons
> 110 sq. ft.	2 persons
90 – 110 sq. ft.	1½ persons
70 – 90 sq. ft.	1 person
50 – 70 sq. ft.	½ person
< 50 sq. ft.	Nil

- *Sex separation:* Overcrowding is said to exist if two persons over 9 years of age, not husband and wife, of opposite sexes are obliged to sleep in the same room

- *Recommended spaces:*
  - Floor space per person in a house: minimum 90 – 110 sq. ft.
  - Floor area per student in a class: > 10 sq. ft.
  - Space per worker in a factory (The Factory Act, 1948): >500 cu. ft.

115. Ans. is (a) 70-90 sq. ft. *[Ref. Park 23/e p752]*
- Optimum floor space recommended per adult person in a house: 70 – 90 sq.ft. (7 – 9 sq.m.)

WASTE DISPOSAL

116. Ans. (d) Bangalore method (Composting) *[Ref. Park 23/e p755]*

Also Remember

- *Composting*: Integrated 'sanitary' method of disposal of refuse & night soil
  - Bangalore method (Anaerobic hot fermentation process): Alternate layers of refuse & night soil in proportion 3:1, with refuse layer both as lowermost as well as topmost.
  - Indore Method (Aerobic process).

117. Ans. (c) Sullage *[Ref. Park 23/e p762]*

Also Remember

- *Sullage (Grey water):* Is non-industrial wastewater generated from domestic processes such as kitchen, laundry and bathing
  - Greywater comprises 50-80% of residential waste water; it consists wastewater generated from all of the house's sanitation equipment except for the toilets
- 'Black water' is water from toilets
- 'White water' is groundwater or potable water.

118. Ans. (b) Dry weather flow *[Ref. Park 23/e p763]*
- *Sewage:* Is waste water from a community, containing solid and liquid excreta, derived from houses, street and yard washings, factories and industries
- *Composition of sewage:* 99.9% water + 0.1% solids (organic & inorganic)
- *Dry weather flow:* Is the average amount of sewage that flows in sewerage system in 24 hours
- *Strength of sewage is expressed in terms of:*
  - *Biological Oxygen Demand (BOD):* Is defined as 'amount of oxygen absorbed by a sample of sewage' during a specified period (Generally 5 days), at a specified temperature (generally 20° C) for aerobic destruction or use of organic matter by living organisms
    1. BOD is most important test done on sewage (done through Dilution method and Manometric method)
    2. Strong Sewage has BOD > 300 g/litre and Weak Sewage has BOD < 100 g/litre
  - *Chemical Oxygen Demand (COD):* Measures oxygen equivalent of that portion of organic matter in a sample, which is susceptible to oxidation by a strong chemical oxidizer
    1. Potassium dichromate is best for COD estimation
  - *Suspended solids:* Amount in domestic sewage varies from 100 – 500 mg/litre
    1. Strong Sewage has suspended solids amount > 500 mg/litre and Weak Sewage has suspended solids amount < 100 mg/litre.

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119. Ans. (a) 2.5 cm *[Ref. Park 23/e p759]*

- The trap: Is a bent pipe in sanitary latrine, about 7.5 cm in diameter and connected with the pan
  - Trap is a 'Water seal': it holds water; prevents access by flies and suppresses the nuisance from smell
  - Depth of water seal in RCA sanitary latrine: 2 cm (¾ inch)
  - Water seal in sanitary latrine is an example of 'Sanitation barrier'

Also Remember

- *Sanitation barrier:* Barrier to prevent spread of faecal – oral diseases
  - Sanitation barrier is between 5F's: Faeces on one side and Fingers, Flies, Fomites, Food (water, soil) on other side
  - Sanitation barrier can be provided by:
    1. Sanitary latrine
    2. Disposal pit

120. Ans. (a) Ideal retention period – 48 hrs *[Ref. Park 23/e p760]*

SEPTIC TANK:

- Is a water-tight masonary tank into which household sewage is admitted for treatment
- Is a satisfactory method of disposing liquid and excreta wastes from individual dwellings, small groups of houses or institutions which have 'adequate water supply but do not have access to a public sewerage system'
- *Design features of a septic tank:*
  - *Ideal retention period:* 24 hours
- *Steps of purification in a septic tank:*
  - *Anaerobic digestion:* takes place in septic tank proper
  - *Aerobic oxidation:* takes place in sub-soil (outside septic tank).

121. Ans. (d) Waste water from kitchen *[Ref. Park 23/e p762]*

122. Ans. (b) Controlled tipping *[Ref. Park 23/e p754]*

- *Sanitary Landfill (Controlled Tipping):* Laying of dry & condensed refuse in layers with intervening earth partitions & coverings, followed by mechanical compression (Most Satisfactory Method)
  - Trench Method
  - Ramp Method
  - Area Method

123. Ans. (b) 2 cm *[Ref. Park 23/e p758-759]*

124. Ans. (a) E. Coli Count *[Ref. Park 23/e p763]*

125. Ans. (a) Organic matter *[Ref. Park 23/e p763]*

- *Biological Oxygen Demand (BOD):* Is defined as 'amount of oxygen absorbed by a sample of sewage' during a specified period (Generally 5 days), at a specified temperature (generally 20° C) for aerobic destruction or use of organic matter by living organisms
  - BOD is most important test done for estimation of strength of sewage (done through Dilution method and Manometric method)
  - Strong Sewage has BOD > 300 g/litre and Weak Sewage has BOD < 100 g/litre.

126. Ans. (c) Sullage *[Ref. Park 23/e p762]*

127. Ans. (d) Septic tank *[Ref. Park 23/e p760]*

128. Ans. (a) Organic waste *[Ref. Park 23/e p763]*

129. Ans. (d) Content of combustible matter above 60% *[Ref. Park 23/e p754-755]*

130. Ans. (b) Chemical oxygen demand *[Ref. K Park 23/e p763]*

131. Ans. (a) Aeration tank *[Ref. K Park 23/e p762]*

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132. **Ans. (a) Treatment of household sewage; (c) Aerobic oxidation outside septic tank; (d) Anaerobic digestion inside septic tank** *[Ref. Park 23/e p763]*

133. **Ans. (b) Strength measured by Biological oxygen demand; (e) Dry weather flow is measured for 24 hours period** *[Ref. Park 23/e p764]*

Review Questions

134. **Ans. (c) Activated sludge process** *[Ref. Park 23/e p764]*

135. **Ans. (d) Used where public sewerage system is adequate** *[Ref. Park 23/e p760]*

136. **Ans. (b) Secondary treatment of sewage** *[Ref. Gupta & Mahajan 3/e p 62, Park 23/e p764]*

137. **Ans. (d) Controlled tipping** *[Ref. Park 23/e p754]*

138. **Ans. (a) Water seal** *[Ref. Park 23/e p759]*

139. **Ans. (d) Retention period is of 24 hrs** *[Ref. Park 23/e p760]*

140. **Ans. (c) Settlement of heavy objects** *[Ref. Park 23/e p763]*

141. **Ans. (d) Coliform count** *[Ref. Park 23/e p763]*

142. **Ans. (a) Gobar gas plant** *[Ref. interent]*

143. **Ans. (b) Sullage** *[Ref. Park 23/e p762]*

MISCELLANEOUS (ENVIRONMENT)

144. **Ans. (c) Residual level of free chlorine to be > 0.5 ppm** *[Ref. Park 23/e p728]*

SANITATION MEASURES FOR SWIMMING POOL SANITATION:

- Recommended area: Recommended area is = 2.2 sq. metre (24 sq. ft.) per swimmer
- Surveillance: Rules and regulations to be posted in appropriate place
- Filtration of water: Water to be refiltered in less than 6 hours (rapid sand filters); 15% water to be replaced by fresh water everyday
- Chlorination of water: Residual level of free chlorine to be > 1.0 ppm to protect against bacterial and viral agents
- pH of water: 7.4 – 7.8
- Bacteriological quality of water: To be as close to standards prescribed for drinking water

Also Remember

- Level of residual chlorine to be maintained in drinking water is > 0.5 mg/l (> 0.5 ppm) for a contact period of 1 hour
- Level of residual chlorine to be maintained in all water bodies in post-disaster phase is > 0.7 mg/l (> 0.7 ppm)
  - Level of residual chlorine to be maintained for swimming pool sanitation is > 1.0 mg/l (> 1.0 ppm)

145. **Ans. (b) 5 rads per year** *[Ref. Park 23/e p743]*
- Protection: Maximum permissible radiation exposure is '5 rad per person per year'.

146. **Ans. (d) Radiation protection in pregnancy** *[Ref. An Introduction to Radiobiology by AHW Nias 2/e p86],*

147. **Ans. (b) Rad** *[Ref. K Park 23/e p743]*

148. **Ans. (c) 0.5 mm** *[Ref. Flexible Bronchoscopy by AC Mehta, 3/e p26]*

149. **Ans. (c) Rajasthan** *[Ref. Me'n' Mine English Grammar III by Ambika Roshan, p180]*

150. **Ans. (c) 5 rads** *[Ref. Roberts and Hedges Clinical Procedures in Emergency Medicine, 6/e p1471]*

Review Questions

151. **Ans. (d) Bed resistance in a slow sand filter** *[Ref. Park 23/e p711-712]*

152. **Ans. (d) Air pollution** *[Ref. Park 23/e p736]*

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ENTOMOLOGY AND VECTOR CONTROL

153. Ans. (d) Kyasanur forest disease *[Ref. Park 23/e p768]*

Vectors and Diseases Transmitted

Vector	Disease (s) transmitted
Housefly (Musca domestica)	Diarrhoeal & dysentrical diseases, Poliomyelitis, Yaws, Anthrax, Trachoma
Sandfly (Phlebotamus argentipes)	Kala azar (Visceral Leishmaniasis), Oriental sore (Cutaneous Leishmaniasis), Sandfly fever, Oroya fever
Tse-Tse fly (Glossina palpalis)	Sleeping sickness of Africa (African Trypanosomiasis)
Reduviid bug (Triatominae)	Chagas Disease (Sleeping sickness of America- American Trypanosomiasis)
Black fly (Simulum)	Onchocerciasis (River Blindness)
Soft tick	Relapsing fever, Q fever, KFD (outside India)
Hard tick	Tularemia, Babesiosis, KFD (India), Tick paralysis, Tick encephalitis, Tick hemorrhagic fever, Indian Tick Typhus, RMSF
Louse	Epidemic typhus, Trench fever, Relapsing fever, Pediculoses
Mite	Scrub typhus, Rickettsial pox
Flea	Plague, Murine typhus
Anopheles mosquito	Malaria, Filaria (outside India)
Culex mosquito	Bancroftian Filariasis, Japanese Encephalitis, West Nile fever, Viral rthritis
Aedes mosquito	Yellow fever, Dengue, DHF, Chikungunya, Rift Valley fever, Filariasis (Outside India)
Mansonoides mosquito	Malayan (Brugian) filariasis, Chikungunya

Also Remember

- *Mites (Chiggers):* resembles ticks in their general appearance
  - Trombiculid mite (Leptotrombium): transmits Scrub typhus
  - Itch mite (Sarcoptes/ Acarus): transmits Scabies
- *Transmission of KFD:*
  - KFD in India is transmitted by: 'Hemophysalis spinigera'(Hard Ticks)
  - KFD outside India is transmitted by: Soft ticks
- *KFD is also known as 'Monkey disease'*
- *Man in KFD:* Incidental, dead-end host (No man-to-man transmission)
- *IP of KFD:* 3 – 8 days
- *Case fatality rate of KFD:* 5 – 10%.

154. Ans. (a) Contact poison *[Ref. Park 23/e p773]*

Also Remember

- *Pyrethrum*:
  - *Space spray for killing 'adult mosquitoes'*: Active principal 'pyrethrin'; no residual action – short-lived effect
  - Contact 'nerve' poison
  - Knock-down effect with paralysis
  - *Insecticide of plant origin*: Flowers of Chrysanthemum
  - *5 active principles (all 'nerve poisons')*:
    1. Pyrethrin I
    2. Pyrethrin II
    3. Cinerin I
    4. Cinerin II
    5. Jasmoline II
  - *No residual effect*: Short lived effect
  - *Synthetic pyrethroids*: permethrin, allethrin, furethrin, cyclethrin
  - Because of the natural insecticidal properties used as 'companion plants', to repel pest insects from nearby crops.

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155. Ans. (d) A-III, B-II, C-IV, D-I *[Ref. Park 23/e p772-773]*

Also Remember

- Experts now recommend an 'integrated approach' for arthropods control
- Best level of prevention of arthropod borne diseases: Primordial prevention (e.g- source reduction)
- Barbados Millions (Lebister reticulates) is a larvivorous fish used for biological control of mosquitoes
- Toxorhynchitis splendens: also known as Predator mosquito are particularly useful biological method for Aedes aegypti
- Mosquito nets are used as personal protection measures:
  - Maximum recommended size of holes in mosquito nets: 0.0475 inch
  - Maximum recommended no. of holes in mosquito nets: 150/sq.inch
- Bacillus thuringiensis H14: Spores and crystalline insecticidal proteins produced by B. thuringiensis are used as specific insecticides. Because of their specificity, these pesticides are regarded as environmentally friendly, with little or no effect on humans, wildlife, pollinators, and most other beneficial insects.

156. Ans. (b) Culex *[Ref. Park 23/e p770-771]*

Also Remember

- Important culex species in India:

Vector	Disease transmitted
Culex quinquefasciatus (fatigans)	Bancroftian Filariasis
Culex tritaeniorhyncus	Japanese Encephalitis
Culex vishnuii	Japanese Encephalitis
Culex gelidus	Japanese Encephalitis

157. Ans. (b) Q fever *[Ref. Park 23/e p777]*

- *LICE (singular LOUSE):* wingless insects, also known as 'Fly babies'
- *Lice as the vectors of diseases:*

Diseases transmitted by lice	Causative agent
Epidemic typhus	Rickettsia prowazekii
Relapsing fever	Borrelia recurrentis
Trench fever	Rickettsia quintana
Dermatitis	Due to scratching & secondary infection

Also Remember

- *Q Fever:*
  - Causative agent: Coxiella burnetii
  - Only Rickettsial disease without any vector (soft tick in few animal cases)
  - Only Rickettsial disease without any skin lesion
  - Mode of Transmission: Inhalation of Infected dust, Aerosol transmission, direct contact
  - Contaminated food like meat, milk & milk products
  - IP : 2-3 weeks

158. Ans. (b) Malarial parasite in mosquito *[Ref. Park 23/e p768)*

- *Biological transmission of arthropod-borne diseases:*

Transmission	Definition	Examples
Propagative	Disease agent only multiplies in the body of vector	Plague bacilli in rat fleas Yellow fever virus in Aedes mosquitoes
Cyclo-propagative	Disease agent undergoes cyclical change as well as multiplies in the body of vector	Malarial parasite in anopheline mosquitoes
Cyclo-developmental	Disease agent undergoes only cyclical change in vector	Filarial parasite in culex mosquitoes Guineaworm embryo in cyclops

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159. Ans. (d) Agent transmitted from nymph to adult vector: Transovarial transmission *[Ref. Park 23/e p780]*

- *Trans-stadial transmission:* Agent transmitted from nymph to adult vector
  - Borrelia burgdorferi in ticks
- *Trans-ovarial transmission (vertical transmission):* Female vector passes the infectious agent through her eggs to the next generation
  - Rickettsia rickettsii in ticks.

160. Ans. (b) It is a definitive host in filaria *[Ref. Park 23/e p769]*

- *In lymphatic and Brugian Filariasis:* Man is the definitive host and mosquito the intermediate host
- *HOST:* A person or other animal, including birds & arthropods, that affords subsistence or lodgement to an infectious agent under natural (as opposed to experimental) conditions
  - *Primary (definitive) host:* host in which parasite attains maturity or passes its sexual stage
  - *Secondary (intermediate) host:* host in which parasite is in larval or asexual stage

Disease	Parasite	Host	
		Primary	Secondary
Malaria	Plasmodium	Anopheles	Man
Tapeworm	Taenia solium	Man	Pigs
Tapeworm	Taenia saginata	Man	Cattle
Guinea worm	Dracunculus medinensis	Man	Cyclops
Filariasis	Wuchereria bancrofti	Man	Culex
Hydatid Disease	Echinococcus	Dog	Sheep, Cattle, Man
Sleeping sickness	Trypanosomes	Man	Tse tse fly

  - *Obligate host:* Only Host for a Parasite. For example, Man in Measles, Man in Typhoid Fever
  - *Transport host:* A carrier in which the organism remains alive but does not undergo development
  - *Paratenic host:* Is similar to an intermediate host, only that it is not needed for the parasite's development cycle to progress.
    1. The difference between a paratenic and reservoir host is that the latter is a primary host, whereas paratenic hosts serve as "dumps" for non-mature stages of a parasite which they can accumulate in high numbers.
  - *Dead-end host:* Is an intermediate host that does generally not allow transmission to the definite host, thereby preventing the parasite from completing its development. For example, humans are dead-end hosts for Echinococcus canine tapeworms.

161. Ans. (b) Scabies *[Ref. Park 23/e p781-782]*

- *Diagnosis of scabies:*
  - Itching which worsens at night
  - Follicular lesions at affected site
  - Secondary infection leads to crusted papules and pustules
  - MC sites: Hands & wrists (63%)
  - Other members of the family are affected
  - Confirmation of diagnosis: Search for parasite in skin debris under microscope.

162. Ans. (d) Chagas' disease *[Ref. Park 23/e p780]*

- *Reduviid bugs (Triatominae):*
  - Also known as 'Cone – nose bugs' or 'Kissing bugs' or 'Assassin bugs'
  - Vectors of Chagas' Disease (American Trypanosomiasis – 'Sleeping sickness of America'), caused by Trypanosoma cruzi.

Also Remember

- *Vector for Relapsing fever:* Soft tick
- *Vector for Lyme's disease:* Hard tick
- *Vector for Scrub typhus:* Trombiculid mite.

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163. Ans. (a) Tick *[Ref. Park 23/e p780-781]*

- *Hard ticks versus Soft ticks:*

	Hard ticks	Soft ticks
Diseases transmitted	Tick typhus (RMSF) Viral encephalitis Tick fevers Hemorrhagic fevers Tularaemia Tick paralysis Human babesiosis	Q fever (few animal cases) Relapsing fever KFD (outside India) (KFD in India)

- Mites (Chiggers): resembles ticks in their general appearance
  - Trombiculid mite (Leptotrombium): transmits Scrub typhus
  - Itch mite (Sarcoptes/Acarus): transmits Scabies.

164. Ans. (a) Tiger mosquito *[Ref. Park 23/e p771]*

- Aedes mosquitoes (Stegomyia) have white stripes on a black body; because of their striped/ banded character of legs, they are known as 'Tiger mosquitoes'.

165. Ans. (b) Housefly *[Ref. Park 23/e p774, 775]*

Also Remember

- *Biting flies:* Only females bite except in Tsetse flies where both sexes bite and transmit the disease
  - Sandflies – Tsetse flies
  - Blackflies – Deerflies
  - Horseflies
- *Important flies of public health importance:*

Fly (biological name)	Disease(s) transmitted
Housefly (Musca domestica)	Typhoid and paratyphoid fevers, diarrhoeas and dysenteries, cholera and gastroenteritis, amoebiasis, helminthic manifestations, Poliomyelitis, Yaws, Anthrax, Trachoma, conjunctivitis)
Sandfly (Phlebotamus argentipes	Kala – azar, Oriental sore, Sandfly fever, Oraya fever
Tse tse fly (Glossina palpalis)	Sleeping sickness of Africa (African Trypanosomiasis)
Blackfly (Simulum indicum)	Onchocerciasis (River blindness)
Deerfly/ Horsefly (Chrysops)	Loa loa, Tularaemia, Anthrax

166. Ans. (a) Sand fly *[Ref. Park 23/e p775, 776]*

SANDFLY:

Diseases transmitted by Sandflies:

Sandfly species	Diseases transmitted
Phlebotamus argentipes	Kala azar (Visceral Leishmaniasis)
Phlebotamus papatasii	Sandfly fever, Oriental sore (Cutaneous Leishmaniasis)
Phlebotamus sergenti	Oriental sore (Cutaneous Leishmaniasis)
Sergentomyia punjabensis	Sandfly fever

- *Habitats:* Holes and crevices in walls, holes in trees, dark rooms, stables and store rooms
  - Sanitation measures are carried out for a distance of 50 feet
- *Insecticide of choice:* DDT (1 – 2 gm/m^2 single application)
  - DDT is sprayed upto height of 4 – 6 feet of walls: as Sandfly cannot fly; it only hops
- *Only female sandflies bite:* Require a blood meal every 3 – 4 days for oviposition.

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167. Ans. (a) Tularemia *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p235, Park 23/e p780-781]*

Also Remember

- *Q fever is only rickettsial Disease without any vector:* only in few animal cases, soft tick is vector
- KFD in India is transmitted by 'Hemophysalis spinigera' (Hard Ticks)
- *Vector of Bancroftian filariasis:* Culex quinquefasciatus (C.fatigans)
- *Vector of Japanese encephalitis:* Culex tritaeniorhynchus (MC), Culex vishnuii, Culex gelidu

168. Ans. (d) Black fly – Chagas Disease *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p224, Park 23/e p777]*

BLACK FLY (SIMULUM):

- Simulum is vector for Onchocerciasis (River blindness)
- Simulum is also known as 'White socks'

Also Remember

- There are more than 35 species of Black fly in India but none associated with human disease
- Chagas disease (Sleeping sickness of America) is transmitted by Reduviid bug (Kissing bug).

169. Ans. (a) Environmental Control *[Ref. Park 23/e p774-775]*

Also Remember

- *Residual sprays for mosquito control:*

Toxicant	Dosage (gm/m²)	Av. duration of effectiveness (months)
DDT	1 – 2	6 – 12
Lindane	0.5	3
Malathion	2	3

170. Ans. (b) 100 meters *[Ref. Park 23/e p770, 771]*

- *Flight range of important mosquito vectors in India:*

Mosquito vector	Flight range
Anopheles	3 – 5 km
Culex	11 km
Aedes	100 m (110 yards)
Mansonia	-

- *International measures to restrict spread of Yellow Fever (vector: Aedes aegypti) are specified under International Health Regulations (IHRs):*
  - Travellers:
    1. Must possess a valid International certificate of vaccination (validity 10days – 10yrs) against YF before they enter 'YF receptive areas'
    2. If no such certificate available: Quarantine for 6 days (Max I.P of YF) from date of leaving an infected area
    3. If traveller arrives before certificate becomes valid (10 days after vaccination): Isolate till it becomes valid
  - Mosquitoes:
    1. Aircrafts/ships arriving from endemic areas: Aerosol spray to kill insect vectors
    2. Airports/seaports kept free from vector breeding: at least 400 meters around boundary
    3. Aedes aegypti index: kept below 1
- Simulum (Black fly), vector of Onchocerciasis (River blindness) has a flight range of 100 miles.

171. Ans. (c) 8-34 days *[Ref. Park 23/e p772]*

- *Life span of a mosquito varies from:* 8 to 34 days
  - Males, as a rule, are short lived
  - Life of a mosquito is influenced by temperature & humidity

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- Egg stage lasts for 1 – 2 days
- *Gonotrophic cycle:* Period that elapses from the moment a blood meal is taken until the eggs are laid; it is about 48 hrs in hot & humid tropical areas
  - Larva: Passes through 4 stages of growth called 'instars', with moulting between each stage
- Larval stage occupies 5 – 7 days
- Culicine larvae (Culex, Aedes, Mansonia) have a siphon tube
  - Pupa: Represents 'resting stage' in life cycle of mosquito
- Pupal stage lasts for 1-2 days
- Have 2 respiratory tubes (trumpets) in thorax
- Does not feed, prefers to stay quiet at the water surface
  - Adult: Life cycle from egg to adult is complete in 7 – 10 days
- Adult mosquito lives for about 2 weeks.

172. Ans. (b) It is more effective against Anopheles *[Ref. Foundations of Community Medicine, GM Dhaar & I Robbani, 1/e p247, Park 23/e p772]*

PARIS GREEN (COPPER ACETOARSENITE):

- Emerald green, microcrystalline powder
- Anti-larval measure, kills mainly Anopheles larvae as they are surface feeders
  - Bottom feeding larvae can also be killed, when applied as a special granular formulation
- Paris green is a 'stomach poison'
- Is most widely used larvicide for mosquito control
- Recommended dose: 1 kg paris green per hectare water surface
  - In dosage applied, paris green does not harm fish, man or domestic animals

Also Remember

- *Pyrethrum:* Space spray
  - Anti-adult, nerve poison, kills mainly by 'knock down' effect
  - Dosage: 1oz (0.1% Pyrethrin) per 1000 cu.ft. of space
  - Disadvantage: No residual action; reinfestation occurs within a short time.

173. Ans. (d) Trench fever *[Ref. Park 23/e p775-776]*

Also Remember

- *Sandfly:*
  - Insecticide of choice: DDT (second line: BHC)
    1. Dose: 1-2 gm/sq. metre (2 rounds per year)
    2. DDT is sprayed on walls up to height of 6 feet (2 metres) from floor level
    3. For long lasting results, spraying should be combined with sanitation measures
- *Trench fever:* a rickettsial disease limited to Central Europe
  - Causative agent: Bartonella Quintana (earlier, Rochalimaea Quintana)
  - Vector: Louse
  - Reservoir: Humans
  - Mode of transmission: Louse faeces
  - Drug of choice: Tetracycline.

174. Ans. (b) Pneumonic plague *[Ref. Park 23/e p778-779]*

RAT FLEA (XENOPSYLLA):

- *Rat flea acts as a vector for:*
  - Bubonic plague
  - Murine (endemic/flea-borne) typhus
  - Chiggerosis
- *Rat flea acts as a host for:*
  - Hymenolepis diminuta (Rat tapeworm)
  - Hymenolepis nana (Dwarf tapeworm)

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Also Remember

- Pneumonic plague is the most virulent and least common form of plague, caused by the Yersinia pestis
  - Typically, pneumonic form is due to a secondary spread from advanced infection of an initial bubonic form
  - Pneumonic plague is not vector-borne like bubonic plague: results from inhalation of aerosolized droplets and can be transmitted from human to human 'without involvement of fleas or animals'
  - Most apparent symptom: coughing, often with hemoptysis
- Human flea (Pulex irritans): can lead to restlessness, and both irritation and scratching of the skin
  - Pulex irritans is also a vector of Yersinia pestis (plague).

175. Ans. (b) 5% Permethrin *[Ref. CMDT 2014, p144, Park 23/e p781-782]*

- *Scabies:* Is a transmissible ectoparasite skin infection characterized by superficial burrows, intense pruritus (itching) and secondary infection
  - Scabies is caused by the mite Sarcoptes scabei, variety hominis (known as 'Itch mite')
  - Scabies is usually transmitted by close contact with an infested person. Scabies is transmitted readily, often throughout an entire household, by skin-to-skin contact with an infected person and thus is sometimes classified as a sexually transmitted disease (STD)
  - *Drug of Choice for scabies:* 5% Permethrin
  - Other useful treatments:
  - Scabies was the first disease of man with known cause
  - *Other treatment modalities for Scabies:*
    1. 25% Benzyl benzoate (2 applications)
    2. 1% HCH (Gammaxene; lindane) (2 applications)
    3. 5% Tetmasol solution (3 daily applications)
    4. 10% Sulphur ointment (4 daily applications)
    5. Crotamiton lotion (3 applications)
    6. Malathion (1 application)
    7. Ivermectin (Single dose)—Oral/Systemic Drug of Choice
    8. Neem oil (for persistent cases).

Also Remember

- In scabies, the impregnated female 'tunnels into the stratum corneum of the skin' and deposits eggs in the 'burrows'
- Scabies is sometimes classified as a sexually transmitted disease (STD): transmitted readily by skin-to-skin contact with an infected person
  - Scabies transmission cannot be prevented by using condoms.

176. Ans. (d) Oriental sore *[Ref. Park 23/e p786-787]*

- *Diseases associated with rodents*:

Bacterial	Viral	Rickettsial	Parasitic	Others
Plague	Lassa fever	Scrub typhus	Hymenolepis dimunita	Rat bite fever
Tularaemia	Hemorrhagic fever	Murine (Flea-borne) typhus	Leishmaniasis	Leptospirosis
Salmonellosis	Encephalitis	Rickettsial pox	Amoebiasis	Histoplasmosis
			Trichinosis	
			Chagas disease	

Also Remember

- *Rodenticides:* pest control chemicals intended to kill rodents
  - Anticoagulants: 4-hydroxy coumarin
  - Phosphides: Zinc phosphide, aluminium phosphide
  - Calciferols: Vitamin D
  - Others: ANTU (a–naphthylurea), arsenic, barium, thallium, strychnine
- *Rodenticides dangerous to use:* Arsenic trioxide, Phosphorus, Thallium sulphate, ANTU, Gophacide.

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177. Ans. (d) Pyrethrum *[Ref. Park 23/e p772]*

178. Ans. (a) Mite *[Ref. Park 23/e p781-782]*

179. Ans. (d) Japanese encephalitis *[Ref. Park 23/e p771]*

180. Ans. (a) Yellow fever; (b) Dengue; (d) Filariasis *[Ref. Park 23/e p771]*

181. Ans. (a) Epidemic typhus; (c) Trench fever *[Ref. Park 23/e p777]*

182. Ans. (a) Dieldrin; (d) Propoxur; (e) Lindane *[Ref. Park 23/e p783]*

- *Organo-phosphorus Insecticides:*
  - Malathion
  - Fenthion
  - Fenitrothion
  - Dioxathion
  - Parathion
  - Diazinon
  - Chlorpyrifos
  - Chlorthion
- *Organo-chlorine Insecticides:*
  - DDT
  - Lindane
  - BHC (HCH)
  - Dieldrin
- *Carbamate Insecticides:*
  - Carbaryl
  - Propoxur

183. Ans. (c) Yellow fever; (d) Filaria; (e) Dengue *[Ref. Park 23/e p771]*

184. Ans. (b) Typhus; (c) Dengue; (d) J.E. *[Ref. Park 23/e p772-773]*

185. Ans. (a) Aedes *[Ref. K. Park 23/e p777]*

186. Ans. (b) Q fever *[Ref. K. Park 23/e p777]*

187. Ans. (b) Eggs can't survive >1 wk without water *[Ref. K. Park 23/e p771]*

- Egg stage of mosquito life cycle lasts for 1-2 days only, so there is no question of survival more than 1 week
- Aedes mosquitoes are recurrent, fearless biters, chiefly bite during day
- *Aedes mosquitoes transmits*:
  - Dengue
  - Yellow fever
  - Chikungunya fever
- It takes 7-8 days to develop the parasite & transmit the disease (extrinsic incubation period)

188. Ans. (a) Relapsing fever *[Ref. Park 23/e p780-781]*

189. Ans. (b) Phlebotamus *[Ref. Park 23/e p783-784]*

DDT (Dichloro-diphenyl-trichloro ethane) Organochlorine

- Synthesised by Zeidler (1874); Insecticidal properties discovered by Noble prize winner Paul Miller (1939)
- Technical DDT: 70-80% para-para isomer (most active form)
- Mechanism of action: Contact (Nerve) poison (hours to kill) (Acetylcholiesterase inhibitor)
- DDT has 'No repellent action' but 'redidal action for 18 months'
- Dosage: 100-200 mg per sq.ft.
- Sandflies (Phlebotamus) have not demonstrated resistance to DDT

190. Ans. (a) Use of alkaline soap water in factory *[Ref. Internet, Wikipedia]*

Alkaline soap water is not used in factories for mosquito control.

191. Ans. (a) Ingestion *[Ref. K. Park 23/e p97-98]*

Methods of transmission of disease by vectors:

- Biting
- Regurgitation
- Scratching-in/Rubbing of infective surfaces
- Contamination of host with body fluids of vectors.

192. Ans. (c) Malathion *[Ref. K. Park 23/e p784]*

MALATHION

Is 'least toxic among Organophosphate compounds'

- Because of its low toxicity, it is recommended as 'an alternative to DDT'
- Dosage: 100-200 mg per sq. ft. every 3 months

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- ULV spray: Used to kill adult mosquitoes
- Mechanism of action: Interfere with transmission of nerve impulses
- Act by 'inhibiting Acetyl-cholinesterase'

193. **Ans. (c) Immediately kills the prey** *[Ref. K. Park 23/e p783-784]*
194. **Ans. (a) DDT** *[Ref. K. Park 23/e p783-784]*
195. **Ans. (d) Filariasis** *[Ref. K. Park 23/e p770-771]*
196. **Ans. (e) Rifampicin** *[Ref. K. Park 23/e p782]*
197. **Ans. (d) Chikungunya Fever** *[Ref. Park 23/e p772]*
    - Mansonia can transmit Malayan (Brugian) filariasis, Chikungunya fever
198. **Ans. (b) Siphon tube** *[Ref. Park 23/e p771]*
199. **Ans. (d) 1, 3 and 5** *[Ref. Park 23/e p768]*
200. **(c) Malaria** *[Ref. Park 23/e p756]*
201. **(c) Visceral leishmaniasis** *[Ref. Park 23/e p776]*

    SANDFLY (PHLEBOTAMUS):
    - Legs twice as long as body
    - Lanceolate (Flame shaped) wings
    - Fine hairs on margins of wings

Review Questions

202. **Ans. (c) Kyasanur forest disease (KFD)** *[Ref: Park 23/e p780-781]*
203. **Ans. (d) 70-80%** *[Ref: Park 23/e p783-784]*
204. **Ans. (b) Larvicide** *[Ref: Park 23/e p772-773]*
205. **Ans. (b) Anopheles stephensi** *[Ref: Park 23/e p770]*
206. **Ans. (a) Malathion** *[Ref. Park 23/e p784]*
207. **Ans. (b) Sleeping sickness is caused by tse tse flies** *[Ref. Park 23/e p776]*
208. **Ans. (c) Contact poisons** *[Ref. Park 23/e p772-773]*
209. **Ans. (a) Onchocerciasis** *[Ref. Park 23/e p777]*
210. **Ans. (a) Pyrethrum** *[Ref. Park 23/e p772]*
211. **Ans. (d) It has repellent action on insects** *[Ref. Park 23/e p772-773]*
212. **Ans. (d) Japanese encephalitis** *[Ref. Park 23/e p771]*
213. **Ans. (a) Dengue fever** *[Ref. Park 23/e p246, 771]*
214. **Ans. (a) Organochlorine compound** *[Ref. Park 23/e p772-773]*
215. **Ans. (a) Anopheline** *[Ref. Park 23/e p770]*
216. **Ans. (a) Mosquito** *[Ref. Park 23/e p768]*
217. **Ans. (c) Ticks** *[Ref. Park 23/e p780-781]*
218. **Ans. (b) Culex** *[Ref: Park 23/e p772]*
219. **Ans. (b) Causes ulcers in foot** *[Ref. Park 23/e p775-776]*
220. **Ans. (c) Aedes aegypti** *[Ref. Park 23/e p772]*
221. **Ans (a) Pyrethrum** *[Ref. Park 23/e p772]*
222. **Ans. (b) Babesiosis** *[Ref. Harrison's 17/e p1294, Park 23/e p780-781]*
223. **Ans. (a) KFD** *[Ref. Park 23/e p772]*
224. **Ans. (b) Pyrethrum** *[Ref. Park 23/e p772]*
225. **Ans. (b) JE** *[Ref. Park 23/e p772]*

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226. **Ans. (b) Q fever** *[Ref. Park 23/e p780-781]*
227. **Ans. (b) Culex** *[Ref. Park 23/e p771]*
228. **Ans. (b) Anopheles** *[Ref. Park 23/e p770]*
229. **Ans. (a) Organophosphorous compound** *[Ref. KDT 5/e p90]*
230. **Ans. (a) Culex** *[Ref. Park 22/e p772]*
231. **Ans. (c) Mansonia** *[Ref. Park 23/e p772-773]*
232. **Ans. (a) Tick** *[Ref. Park 23/e p780-781]*
233. **Ans. (a) Mite** *[Ref. Park 23/e p780-781]*
234. **Ans. (a) 1** *[Ref. Park 23/e p283]*
235. **Ans. (a) Residual action is similar to DDT** *[Ref. Park 23/e p772]*
236. **Ans. (a) Red** *[Ref. Insecticides Rules 1971, Central Insecticides Board, India]*
    Toxicity Colour Labels of Pesticides in India
    - ***Red label***: Extremely toxic
      - Zinc phosphide
    - ***Yellow label***: Highly toxic
      - Endosulphan
    - ***Blue label***: Moderately toxic
      - Malathion
    - ***Green label***: Slightly toxic
      - Mosquito repellants
237. **Ans. (a) Trench fever; (d) Epidemic typhus; (e) Pediculosis** *[Ref. K Park 23/e p777]*
238. **Ans. (d) RMSF; (e) Crimean Congo Fever** *[Ref. K Park 23/e p780-781]*
239. **Ans. (a) Malaria** *[Ref. K Park 23/e p768]*
240. **Ans. (b) Propogative cycle** *[Ref. K Park 23/e p768]*
241. **Ans. (b) DDT** *[Ref. K Park 23/e p772-773]*
242. **Ans. (a) Ticks [MOST COMMON: Inhalation]** *[Ref. K Park 23/e p780-781]*
243. **Ans. (b) Anopheles stephensi** *[Ref. K Park 23/e p770]*
244. **Ans. (b) Oriental sore** *[Ref. K Park 23/e p776]*
245. **Ans. (b) Larvicide** *[Ref. K Park 23/e p772-773]*
246. **Ans. (b) Anopheles stephensi** *[Ref. K Park 23/e p770]*
247. **Ans. (b) Less than 100 m** *[Ref. K Park 23/e p771]*
248. **Ans. (a) 400 m** *[Ref. K Park 23/e p771]*
249. **Ans. (a) Rickettesial disease** *[Ref. Rickettsiology and Rickettsial Diseases, 5th International Conference, p146]*
250. **Ans. (b) Filaria** *[Ref. K Park 23/e p768]*
251. **Ans. (b) Residual spray** *[Ref. K Park 23/e p784]*
252. **Ans. (a) Ticks** *[Ref. K Park 23/e p780, 781]*
253. **Ans. (a) Eliminate breeding places** *[Ref. K Park 23/e p774-775]*
254. **Ans. (a) 50 yards** *[Ref. K Park 23/e p775-776]*
255. **Ans. (b) 150** *[Ref. K Park 23/e p773]*
256. **Ans. (d) Pupa don't have siphon tube** *[Ref. K Park 23/e p770-771]*
257. **Ans. (c) Kyasanur forest disease** *[Ref. K Park 23/e p780-781]*
258. **Ans. (d) 70-80%** *[Ref. K Park 23/e p783-784]*

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259. Ans. (c) 10-15 *[Ref. Manson's Tropical Diseases, 23/e p833]*

260. Ans. (b) 0.0475 inch *[Ref. K Park 23/e p773]*

261. Ans. (c) Lyme's disease *[Ref. K Park 23/e p780-781]*

262. Ans. (a) Yellow fever; (b) Dengue; (c) Chikungunya fever; (e) Rift valley fever

263. Ans. (a) Epidemic typhus; (c) Relapsing fever; (d) Trench fever

264. Ans. (c); (e) No siphon tube in larvae *[Ref. Park 23/e p771]*

265. Ans. (a) Malaria *[Ref. Park 23/e p772]*

266. Ans. (b) Aedes *[Ref. Park 23/e p771]*

267. Ans. (b) Cover overhead tanks properly [Ref. Guidelines for Source Reduction, NVBDCP, Government of India]

- **In urban areas, Malaria is mainly transmitted by Anopheles stephensi:**
  - Breeds in man-made water containers in domestic/peridomestic situations such as tanks, wells, cisterns, which are of permanent nature and hence can malaria transmission throughout the year
- **Recommended measures for Urban Malaria control:**
  - Lids of overhead tanks must be checked and maintained monthly basis; any leakage be repaired immediately (most effective)
  - Cover-up of underground and open tanks
  - Open tanks used for animals be dead dried once in week
  - Never to throw any containers in open capable of holding water
  - Construction sites: Building bye-laws be implemented to prevent fault in designs, water flow on roof, gully traps open tanks for curing be treated with larvicides on weekly basis
  - Unused wells either be closed or treated with larvicides
  - Ornamental tanks, fountains be checked periodically and larvivorous fish be introduced
  - Public health engineers be involved for proper drainage, building designs, periodic flushing of water logged areas and drainage.

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CHAPTER 12

Biomedical Waste Management, Disaster Management, Occupational Health, Genetics and Health, Mental Health

Note: Please Refer to Annexure 13 for NEW PROPOSED DRAFT GUIDELINES OF BMW MANAGEMENT

BMW MANAGEMENT

Hospital Waste Composition[Q]

- Paper: 15%
- Plastic: 10%
- Rags: 15%
- Metals (Sharps, etc): 1.0%
- Infectious waste: 1.5%
- Glass: 4.0%
- General waste (food waste, sweeping of premises)[Q]: 53.5%

Biomedical Waste Management (BMW) in India

- Biomedical Wastes (BMW) in India are handled and managed under *'Biomedical Waste Management (Management and Handling) Rules, 1998'*[Q]
  - Exercising powers: *Sections 6, 8, 25* of *'Environmental (Protection) Act, 1986'* (under the Ministry of Environment and Forests)
- *Schedules under Biomedical Waste Management (Management and Handling) Rules, 1998*:
  - Schedule I[Q]: *Categories of BMW, treatment and disposal*
  - Schedule II[Q]: *Color coding and type of container for BMW disposal*
  - Schedule III[Q]: *Labels for BMW containers/bags*
  - Schedule IV: *Label for transport of BMW containers/bags*
  - Schedule V: *Standards for treatment and disposal of BMW*

I Exercising powers: Sections 6, 8, 25 of 'Environmental (Protection) Act, 1986'.

Categories of Biomedical Wastes (BMW) (Schedule I[Q])

Cat	BMW[Q]	Wastes included[Q]
1.	Human Anatomical Waste	Human tissues, organs, body parts
2.	Animal Waste	Animal tissues, body parts, organs, carcasses, fluids, blood
3.	Microbiology and Biotechnology Waste	Waste from lab cultures, stocks, specimens of microorganisms, live or attenuated vaccines, cell cultures (human/animal), wastes from production of biologicals, toxins
4.	Waste Sharps	Needles, syringes, blades, scalpels, glass
5.	Discarded Medicines and Cytotoxic Drugs	Outdated contaminated and discarded medicines
6.	Soiled Waste	Items contaminated with blood, and fluids, including cotton, dressings, soiled plaster casts, linen, beddings
7.	Solid Waste	Disposable items (except sharps) including tubings, catheters, intravenous sets
8.	Liquid Waste	Waste generated from lab and washing, cleaning, housekeeping and disinfecting activities
9.	Incineration Ash	Ash from incineration of any BMW
10.	Chemical Waste	Chemical used in disinfection (insecticides) or in production of biologicals

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Treatment/Disposal of Biomedical Wastes (Schedule I[Q])

Cat	BMW[Q]	Treatment/disposal[Q]
1.	Human Anatomical Waste	Incineration/deep burial
2.	Animal Waste	Incineration/deep burial
3.	Microbiology and Biotechnology Waste	Local autoclaving/microwave/incineration
4.	Waste Sharps	Chemical treatment/autoclaving/microwave and mutilation/ shredding
5.	Discarded Medicines and Cytotoxic Drugs	Incineration/destruction/secured landfills
6.	Soiled Waste	Incineration/autoclaving/microwave
7.	Solid Waste	Chemical treatment/autoclaving/microwave, mutilation/shredding
8.	Liquid Waste	Chemical treatment
9.	Incineration Ash	Sanitary landfill
10.	Chemical Waste	Chemical treatment and secured landfill (for solids)

I
Treatment/disposal[Q]
- Human Anatomical Waste
- Incineration/deep burial

Colour Coding and Type of Container for BMW Disposal (Schedule II[Q])

Color coding[Q]	Type of container[Q]	BMW category[Q]	Treatment option[Q]
Yellow	Plastic bag	1, 2, 3, 6	Incineration/deep burial
Red	Disinfected container/ Plastic bag	3, 6, 7	Autoclave/Microwave/ Chemical treatment
Blue/ White translucent	Plastic bag	4, 7	Autoclave/Microwave/ Chemical treatment and Destruction/Shredding
Black	Plastic bag	5, 9, 10 (solid)	Secured landfill

Inertization

- *Process:* Mixing biomedical waste with cement and other substance before disposal, so as to minimize risk of toxic substances contained in waste to contaminate ground/ surface water[Q].
  - Inertization is especially suitable for pharmaceuticals and for incineration ashes with high metal content
- *A typical composition of mixture is*:
  - 65% pharmaceutical waste
  - 15% lime[Q]
  - 15% cement[Q]
  - 5% water

BMW Management Treatment Modalities

1. Mechanical Processes

- *Compacting:* Reducing size and volume of waste (Useful for general non-hazardous wastes)
- *Shredding:* Breaking the material into smaller pieces by grinding/cutting/ granulation (Useful for plastics, rubber and soft metals)
- *Landfill:* Oldest method of waste disposal[Q]
  - *Two types:* Open dump or Sanitary landfill
- *Encapsulation*: Filling containers with waste, adding an immobilizing material (plastic foam/bituminous sand/cement mortar/clay material) and sealing containers.

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- *Inertization*: Mixing biomedical waste with cement and other substance before disposal.
  - Useful for pharmaceuticals and for incineration ashes with high metal content.

2. Thermal Processes

I Hot air oven: Causes sterilization and mutilation at 160°C[Q]

I Autoclave: Waste is subjected to 121°C or 135°C[Q].

- *Heat disinfection*: Boiling for 20 minutes[Q]
  - Useful for pre-treatment of sharps and plastics waste
- *Hot air oven*: Causes sterilization and mutilation at 160°C[Q]
  - Used for glassware, powders and oils impermeable to steam
- *Autoclave*: Steam-sterilization under pressure is a low-heat thermal process[Q]
  - Waste is subjected to 121°C or 135°C[Q]
- *Hydroclave*: Steam-sterilization under pressure causes fragmentation of wastes[Q]
  - Waste is subjected to 121°C or 132°C[Q]
- *Microwave*: Volumetric heating for microbial hazardous wastes using frequency of 2450 MHz and wavelength 12.24 nm[Q]
  - Waste destruction occurs by 'heat conduction'[Q]
- *Incineration*: High temperature dry oxidation process which reduces waste volume and weight
  - Waste is subjected to 850 ± 50°C and 1050 ± 50°C[Q]
- *Plasma arc*: Ionized gas (electrical discharges) at high temperature causes gasification and molecular dissociation of organic wastes
  - Waste is subjected to 2000°C[Q]
- *Gamma irradiation*: Useful for re-usable medical equipments and clothing.

3. Chemical Processes

- *Disinfectants:* A disinfectant is a chemical agent, which destroys or inhibits growth of pathogenic micro-organisms in the non-sporing or vegetative state
  - Disinfectants are applied to inanimate objects and materials such as instruments and surfaces to control and prevent infection.
- *Antiseptics:* An antiseptic is a type of disinfectant, which destroys or inhibits growth of micro-organisms on living tissues without causing injurious effects when applied to surfaces of the body or to exposed tissues[Q].

4. Biological Processes

- *Composting:* Land and cow dung (*gobar*) are used[Q]
- *Vermi-composting:* Earth worms (*Eisenia foetida*[Q]), land, matured cow dung (*khad*) and coconut husk are used
  - Not useful for non-biodegradable wastes
- *Bio-digestion:* Biodegradable kitchen waste or left over food of a hospital is used, which leads to production of manure and methane
  - Useful for rural heath care institutions.

Incineration

I Incineration: Is a 'high temperature dry oxidation' process

- *Incineration:* Is a *'high temperature dry oxidation'* process[Q]; It leads to significant reduction in waste-volume and weight (up to 70-80%)
  - *Incineration does not require pre-treatment*[Q]
  - *Biggest disadvantage of incineration*: Generation of smoke[Q]
- *Types of Incinerators:*
  - Double-chamber pyrolytic
  - Single-chamber pyrolytic
  - Rotary kilns
- *Temperature in an incinerator:*
  - *Primary chamber*: 800° ± 50°C[Q]
  - *Secondary chamber*: 1050° ± 50°C[Q]

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- *Characteristics of wastes suitable for incineration*Q:
  - Low heating volume
  - Combustible matter > 60%
  - Non-combustible solids < 5%
  - Non-combustible fines < 20%
  - Moisture content < 30%
- *Wastes types not-to-be incinerated*Q:
  - Pressurized gas containers
  - Reactive chemical wastes (large)
  - Silver/Radiographic/photographic wastes
  - Halogenated plastics (PVC)
  - Wastes with high mercury/cadmium content
  - Sealed ampoules ampoules with heavy metals.
  - Sharps
  - Cytotoxic drugs

I

Wastes types not-to-be incinerated Q:
- Pressurized gas containers
- Reactive chemical wastes
- Silver/Radiographic/photographic wastes
- Halogenated plastics (PVC)
- Wastes with high mercury/cadmium content
- Sealed ampoules ampoules with heavy metals.
- Sharp
- Cytotoxic drugs

Mercury disposal

- Dispose mercury as a hazardous waste
- 'Never combine it with organic or inorganic waste
- Never dispose it in sink/drain
- Dispose off in 'Recycling units'Q

DISASTER MANAGEMENT

Disaster

- *Disaster (WHO):* Is any occurrence that causes damage, ecological disruption, loss of human life or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or areaQ.
- *Disaster (Colin Grant):* Is catastrophe causing 'injury or illness simultaneously to at least 30 people', who will require hospital emergency treatmentQ.
  - *Most commonly reported disease* in post-disaster phase is GastroenteritisQ
  - *Most practical and effective strategy of disease prevention and control* in post-disaster phase is 'supplying safe drinking water and proper disposal of excreta'Q
  - *Foremost step for disease prevention and control* in post-disaster phase is chlorination of all water bodiesQ
  - *Level of residual chlorine to be maintained in all water bodies* in post-disaster phase is > 0.7 mg/l (> 0.7 ppm) Q
  - *A common micronutrient deficiency in disasters is Vitamin A deficiency*Q: It occurs due to deficient relief diets, measles and diarrhea (gastroenteritis)
  - Other common deficiencies include scurvy (Vitamin C), anemia (iron) and pellagra (Vitamin B3 –niacin).

I

Most commonly reported disease in post-disaster phase is Gastroenteritis

I

Foremost step for disease prevention and control in post-disaster phase is chlorination.

Stages of a Disaster CycleQ

- *Disaster impact and response:*
  - Search, rescue and first aid
  - Field care
  - Triage
  - Tagging
  - Identification of dead
- *Stage of health and medical relief:* Disaster containment
  - *Primary phase (0-6 hours):* First aid, medical care
  - *Secondary follow-up (6-24 hours):* Transportation, sanitation and immunization
  - *Tertiary clean up (1-60 days):* Food, clothing, shelter assistance, social service, employment, rehabilitation

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- *Rehabilitation:*
  - Water supply
  - Sanitation and personal hygiene
  - Food safety
  - Vector control
- *Mitigation*[Q]: Measures designed to either prevent hazards from causing emergency or to lessen the effects of emergency
- *Disaster preparedness.*

Triage

- *Triage*[Q]*:* Consists of rapidly classifying the injured *'on the basis of severity of their injuries and likelihood of their survival'* with prompt medical intervention[Q]
  - First come first serve is NOT followed in emergencies[Q]
  - Triage yields best results when carried out at the site of disaster[Q]
- *Triage sieve:* Quick survey to separate the dead and the walking from the injured
- *Triage sort:* Remaining casualties are assessed and allocated to categories
- *Triage system:* Most commonly uses FOUR color code system:[Q]
  - *Red (Highest Priority)*: Immediate resuscitation or limb/life saving surgery in next 6 hours
  - *Yellow (High Priority)*: Possible resuscitation or limb/life saving surgery in next 24 hours
  - *Green (Low Priority)*: Minor illness/AMBULATORY patients
  - *Black (Least Priority)*: Dead and moribund patients
- *Tagging:* Is the procedure where identification, age, place of origin, triage category, diagnosis and initial treatment are tagged on to every victim of disaster through a Colour Coding[Q].

I
Triage[Q]: Consists of rapidly classifying the injured 'on the basis of severity of their injuries and LIKELIHOOD OF THEIR SURVIVAL'.

Types of Triage

- *Triage is of two types:*
  - *Simple triage*: Simple triage is used in a scene of mass casualty, in order to sort patients into those who need critical attention and immediate transport to the hospital and those with less serious injuries
    - This step is required before transportation becomes available
    - The categorization of patients based on the severity of their injuries can be aided with the use of printed triage tags or colored flagging
  - *Rapid triage*: S.T.A.R.T. (*Simple Triage and Rapid Treatment*[Q]) is a simple triage system that can be performed by lightly-trained lay and emergency personnel in emergencies
    - It is not intended to supersede or instruct medical personnel or techniques
    - It may serve as an instructive example
    - It has been field-proven in mass casualty incidents such as train wrecks and bus accidents
- *Reverse Triage*: In addition to the standard practices of triage as mentioned above, there are conditions where sometimes the less wounded are treated in preference to the more severely wounded. This may arise in,
  - A situation such as war where the military setting may require soldiers be returned to combat as quickly as possible
  - Disaster situations where medical resources are limited in order to conserve resources for those likely to survive but requiring advanced medical care.

I
Black (Least Priority): Dead and moribund patients

National Institute for Disaster Management (NIDM)

- *Established:* 1995 (under Indian institute of Public Administration)
- *Ministry In-charge:* Ministry of Home Affairs[Q]
- *Head:* Union Home Minister

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- *Purpose:*
  - To work as a think tank for Government by providing assistance in policy formulation
  - To facilitate in reducing the impact of disasters

National Disaster Response Force and Civil Defence (NDRF)

- *Established:* 2006
- *Composition:* 10 battalions from CRPF, BSF, ITBP, CISF
- *Purpose:*
  - *Civil defence:* To safeguard the life and property of the civilian population and also to maintain the continuity of productive and economic activity of the nation during war time crisis
  - *Home guards:* To assist the police in controlling civil disturbance and communal riots (maintenance of internal security)
  - *Fire cell:* To organize Fire prevention and Fire fighting services, and to render technical advice on Fire Protection, Fire Prevention and Fire Legislation

OCCUPATIONAL HEALTH

Physical Hazards and Diseases[Q]

- High Temperature
  - Heat cramps
  - Heat hyperpyrexia (body temperature <102°F)
  - Heat exhaustion (body temperature >106°F)
  - Heat stroke (body temperature up to 110°F)
- Low Temperature
  - Chilblains
  - Trench Foot
  - Frost bite
- Low Pressure
  - Caisson Disease
- Vibration
  - Vibration sickness
  - Neurogenic damage
- Non-ionizing Radiation
- Microwave Injuries
- Laser injuries

I
0.5 to 3.0 microns are the most dangerous particle size for Pneumoconioses

Pneumoconioses

- *Pneumoconiosis occur due to:* occupational exposure to dust[Q]
- *Particles size:* 0.5 to 3.0 microns are the most dangerous (as a health hazard causing pneumoconiosis), as they reach the interior of lungs with ease[Q]
- *Particle size and behavior:*

Particle size	Behavior
> 10 microns	Settle down by gravity
< 10 microns	Remain suspended in air
5 – 10 microns	Arrested in upper respiratory tract
3 – 5 microns	Deposited in mid respiratory tract
1 – 3 microns	Enter alveoli and settle thereQ
< 1 microns	Brownian movement

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- *List of Pnemoconioses:*

Disease	Exposure source[Q]
Silicosis	Silica dust
Anthracosis[Q]	Coal dust
Asbestosis	Asbestos dust
Byssinosis[Q]	Cotton fibre
Bagassosis[Q]	Molasses (sugarcane)
Berylliosis	Beryllium
Farmer's Lung[Q]	Mouldy hay
Siderosis	Iron dust
Stannosis	Tin dust
Bird fancier's lung[Q]	Avian/ bird droppings
Compost lung	Compost

- *Antigens involved in Pneumoconioses*:

Disease	Antigen[Q]
Bagassosis	Thermoactinomyces sacchari
Farmer's Lung	Micropolyspora faeni
Compost lung	Aspergillus
Chemical workers lung	Isocyanates

Asbestosis

- *Asbestosis is a pneumoconiosis which occurs due to*: Exposure to asbestos
- Asbestosis does not usually appear until after 5-10 years of exposure[Q]
- Sputum shows *'asbestos bodies'*, which are asbestos fibres coated with fibrin
- Asbestos may lead to pulmonary fibrosis, carcinoma of bronchus, mesothelioma of peritoneum/pleura and cancer of GIT[Q]
- Asbestos type most dangerous is *'amphibole'*[Q]

Bagassosis

- *Bagassosis occurs due to:* Occupational exposure to fibrous residue of sugarcane *(bagasse)*; Bagassosis has been shown to be due to *Thermoactinomyces sacchari*[Q]
  - Bagassosis is a form of extrinsic allergic alveolitis
- *Pathogenesis:*
  - Bagasse contains a percentage of silica, innumerable fungal spores and micro-organisms
  - Bagasse dust blocks bronchioles thus leading to bronchitis and bronchopneumonia
- *Prevention and Bagasse control measures*[Q]*:*
  - Keeping moisture content > 20%
  - Spraying bagasse with 2% propionic acid (fungicide)
- *Organisms involved in causation of bagassosis:*[Q]
  - Thermoactinomyces sacchari
  - Thermoactinomyces vulgaris
  - Micropolyspora faeni

Lead Poisoning

- Lead Poisoning is known as *'Plumbism'*, Saturnism or Painter's Colic[Q]
- *Greatest source of lead* in Lead Poisoning (*Plumbism*, Saturnism or Painter's Colic) is Gasoline/petrol/vehicular exhaust/automobile exhaust[Q]

I
Greatest source of lead
Gasoline/petrol.

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- *Mode of absorption*: Lead can be absorbed by inhalation (most common mode[Q]), ingestion or through skin[Q]
- *Clinical picture of lead poisoning*[Q]:
  - Facial pallor: *Earliest and most consistent sign*[Q]
  - Anemia: Microcytic hypochromic[Q]
  - Punctate basophilia or basophilic stippling of RBCs
  - *Burtonian Line*[Q]: Lead sulphide line on gums (upper jaw)
  - *Lead colic*: Constipation (but sometimes diarrhea)
  - *Lead Palsy (Peripheral neuropathy)*: Wrist drop or Foot drop[Q]
  - *Lead encephalopathy*
  - CNS effects: mostly due to organic lead compounds[Q]
- *Diagnosis of lead poisoning*[Q]:

Laboratory parameter	Remark[Q]
Coproporphyrin in Urine (CPU) >150 mcg/l	Exposure to lead
Amino levulinic acid in urine (ALAU) >5 mg/l	Indicates lead absorption
Lead in blood >70 mcg/100 ml	Clinical symptoms appear
Lead in urine >0.8 mg/l	Lead exposure and absorption
Basophilic stippling of RBCs	Punctate basophilia

  - A useful screening test is Coproporphyrin in Urine (CPU).
- *Treatment*: EDTA.

I
Burtonian Line[Q]: Lead sulphide line on gums (upper jaw).

Occupational Dermatitis

- *Causes of occupational dermatitis*:[Q]

Causes	Agents
Physical	Heat, cold, moisture, pressure, friction, x-rays, other rays
Chemical	Acids, alkalis, dyes, slovents, grease, tar, pitch, chlorinated phenols
Biological	Viruses, bacteria, fungi, parasites
Plant products	Leaves, vegetables, fruits, flowers, vegetable dust
Primary iritants	Acids, alkalis, dyes, solvents
Sensitizers	Sensitization of skin

- *Prevention of occupational dermatitis*: **[Mnemonic: P4]**
  - **P**re-selection: Similar to pre-placement examination
  - **P**rotection: Protectiove clothing, barrier creams
  - **P**ersonal hygiene: Washing facilities, water, soap, towel
  - **P**eriodic inspection: Post-placement examination

Occupational Carcinomas

- *Most common*: Nearly 75% of occupational cancers are skin cancers[Q]
  - *Type*: Predominantly *'squamous cell carcinomas'*[Q]
  - *Characteristic feature*: Occurrence on exposed parts of the body (head, neck, hands, arms) that have remained in direct contact with a carcinogenic source
  - *Carcinogens implicated*: UV light, ionizing radiation, coal products, petroleum products, lubricating oils, fuel oils, etc
- *Occupational cancers affect*: Skin, lungs, bladder and blood forming organs
- *Occupational exposures and cancers*:

Agent	Cancer(s) caused[Q]
Asbestos[Q]	Mesothelioma
Arsenic[Q]	Skin. Lung, Liver

I
Nearly 75% of occupational cancers are skin cancers

Cont...

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Cont...

Agent	Cancer(s) caused[Q]
Benzene[Q]	Leukemia
Benzidine[Q]	Urinary bladder
Beryllium	Lung
Cadmium	Lung
Chromium[Q]	Nasal sinus, Lung
Ethylene oxide	Leukemia
Ionizing radiation	Skin, Thyroid, Lung
Nickel[Q]	Nasal sinus, Lung
Polycyclic aromatic hydrocarbons	Skin, Scrotum, Lung
Radon[Q]	Lung
Silica[Q]	Lung
Vinyl chloride[Q]	Liver
Wood dust[Q]	Nasal sinus

Carcinoma Bladder in Occupational Exposures

- Cancer bladder was first noted in man in Aniline industry in 1895
- Now following has been mentioned as possible bladder carcinogens[Q]:
  - β-napthylamines
  - Benzidine
  - Paraamino-diphenyl
  - Auramine
  - Magenta
  - Certain drugs: Cyclophosphamide, Phenacetin
- *Industries associated with cancer bladder*
  - Dye-stuffs and dyeing industry
  - Rubber, gas and electric cable industry
- *Most common symptom*: Blood in the urine (*haematuria*) [Q]
- *Most common type*: Transitional Cell (urothelial cell) carcinoma (TCC) [90%][Q]
- Immunotherapy in the form of 'Intravesical (pharmacotherapeutic) BCG instillation' is also used to treat and prevent the recurrence of superficial tumors[Q].

Decompression Sickness (Caisson's Disease)

- *Caisson Disease (Decompression Sickness, DCS*[Q]*)*: Occurs due to low pressure, when a diver ascends rapidly to surface or air passengers ascend too rapidly to high altitudes
- *Manifestations of air expansion*[Q]:
  - *Barodantalgia*: Air trapped beneath teeth expands
  - *Barosinusitis*: Compressed air trapped in sinuses expands
  - *Barotitis*: Air under pressure trapped in middle ear expands
  - *Emphysema*: Most serious complication[Q] (may lead to cerebral embolism)
  - *Abdominal distension*: Air trapped in intestinal canal expands
- *Effects of Nitrogen effervescence*[Q]:
  - *Bends*: Steady aching pain in joints[Q]
  - *Chokes*: Rapid, shallow, dyspneic breathing[Q]
  - *Prickles*: Irritation of nerve terminals in skin
  - *Paralysis*: Most Serious Complication[Q]
  - *Aseptic bone necrosis*: Hip, knee and shoulder joints
- *Gases implicated in DCS*[Q]:
  - Nitrogen[Q]
  - Trimix (nitrogen + oxygen + helium)
  - Heliox (oxygen + helium)

I

Effects of Nitrogen effervescence:
- Bends
- Chokes
- Prickles

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- Caisson Disease is a type of diving hazard and *dysbarism.*
- *Recompression is the only effective treatment for severe DCS*, although rest and oxygen applied to lighter cases can be effective[Q].

Sickness Absenteeism

- Sickness absenteeism is a *'useful index in industry to assess the state of health of workers'*, and their physical, mental and social well-being[Q]
- *Causes of sickness absenteeism may not be entirely due to sickness*:
  - Economic causes
  - Social causes
  - Medical causes
- *Methods of reducing sickness absenteeism*:
  - Good factory management and practices
  - Adequate pre-placement examination
  - Good human relations
  - Application of ergonomics
- *Rate of absenteeism reported in India*[Q]: 8-10 days per worker per year.

I

Gases implicated in DCS[Q]:
- Nitrogen[Q]
- Trimix
- Heliox Bends

Occupational Health Examination

- *Pre-placement Examination:* Is the foundation of an efficient occupational health service
  - *Timing*: At the time of employment and includes worker's history (medical, family, occupational and social), physical examination and biological and radiological examinations
  - *Main purpose of Pre-placement Examination* is to place *'the right man in right job'*[Q]; so that worker can perform his duties efficiently without detriment to his health *(Ergonomics*[Q]*)*
  - Pre-placement Examination also serves as a useful benchmark for future comparison (examination and epidemiology).
- *Periodic Post-placement Medical Examination*: (for industrial workers) is held at appropriate intervals to test their physical and mental efficiency and to detect any departure from health at the earliest; objective being early diagnosis and prompt treatment *(Secondary level of prevention)*. Frequency of periodic examinations:
  - *Frequency and content depend upon the type of occupational exposure:*[Q]
    - *Annual*: for most of occupational exposures
    - *Monthly*: for lead, radium and dye-stuffs exposure
    - *Daily*: for dichromates exposure.

Ergonomics

- *Ergonomics (human factors):* Is the application of scientific information concerning objects, systems and environment for human use[Q].
- *Physical Ergonomics:* deals with the human body's responses to physical and physiological stress.
- *Cognitive Ergonomics (engineering psychology):* concerns mental processes as they affect interactions among humans and other elements of a system; includes workload, training, interaction, decision-making, errors, etc.
- *Organizational Ergonomics (macroergonomics):* is concerned with the optimization of systems, including their organizational structures, policies, and processes; includes job-satisfaction, motivation, supervision, team work, ethics, etc.

I

Employment prohibited for age less than 14 years[Q].

The Factories Act, 1948

- *Scope*: The Act defines factory as an establishment employing 10 or more persons where power is used and 20 or more persons where power is not used[Q]

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I
A minimum of 500 cubic feet space per worker[Q].
1 Safety Officer per 1000 workers[Q].

- *Work related norms*:
  - Employment of young persons:
  - Employment prohibited for age less than 14 years[Q]
  - 15-18 years old adolescents to be declared fit by 'certifying surgeons'; will work only between 6AM to 7PM
  - Employment prohibited in certain dangerous occupations
  - *Hours of work*[Q]:
    - A maximum of 4½ hours of work per day for adolescents
    - 48 hours per week (9 hrs per day)
    - Maximum 60 hours per week (including overtime)
  - Leave with wages:
    - 1 day per 15 days of work for adolescents
    - Leaves can be accumulated up to 40 days
- *Health, Safety and Welfare recommendations*:
  - A minimum of 500 cubic feet space per worker[Q]
  - 1 Safety Officer per 1000 workers[Q]
  - 1 Welfare Officer per 500 workers
  - 1 Canteen for greater than 250 workers
  - 1 Crèche for greater than 30 women workers
- *Under Factories Act 1948, there are 29 diseases which are notifiable (Schedule 3)*[Q]:
  - Silicosis
  - Anthracosis
  - Byssinosis
  - Asbetosis

I
Diseases which are notifiable
- Silicosis
- Anthracosis
- Byssinosis
- Asbestosis

The Employees State Insurance (ESI) Act, 1948 [New Guidelines 2015]

- ESI Act Is an important measure of social security and health insurance in India
- *Scope of ESI Act*: The act covers all the factories in India *'excluding mines, defence, railways,*[Q]
  - *Act in the first instance applies to*: All non-seasonal factories, employing **10 or more persons**, for wages on any day in implemented areas. It also covers shops, hotels and restaurants, cinemas and theatres, road-motor transport establishments and newspaper establishments[Q] [Now it covers Medical Institutions in few states & UT's]
  - *It covers all states except*: Manipur, Sikkim, Arunachal Pradesh and Mizoram; and UTs of Delhi and Chandigarh
  - *It covers all employees getting income up to* ₹ *15,000/- per month*[Q]
- *Administration*: The Union Minister of Labour is the Chairman of ESI Corporation
- *Finance*:
  - Employer contributes 4.75% of total wage bill[Q]
  - Employee contributes 1.75% of wages (those earning < ₹ 100/- per day exempted)
  - State and Central Government share medical expenditure in ration of 1:7[Q]
- *Benefits to employees under ESI*:
  - *Medical benefit*: Full medical care[Q]
  - *Sickness benefit*: 70% of the average daily wages and is payable for 91 days[Q] (in any continuous period of 365 days)
  - *Extended sickness benefit*: Payable for 2 years for a set of 34 diseases[Q] (80% wages)
  - *Enhanced sickness benefit*: Full average daily wage for duration upto 7 days in the case of Vasectomy and up to 14 days in the case of the Tubectomy[Q]
  - *Maternity benefit*: Full average daily wage for duration upto 12 weeks[Q] (confinement) or 6 weeks (miscarriage or MTP) or 4 weeks (sickness arising out of pregnancy, confinement, premature birth), as the case may be
  - *Temporary disablement benefit*: 90% of the average daily wages till recovery[Q]
  - *Permanent disablement benefit*: 90% of wages for loss of earning as worked out by a medical board
  - *Dependents' benefit*: Pension at rate of 90% of wages[Q]

I
Employer contributes 4.75% of total wage bill.

I
Sickness benefit: 70% of the average daily wages and is payable for 91 days.

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- *Funeral expenses*: Cash not exceeding ₹ 10,000/-
- *Rehabilitation benefit*

GENETICS

Definitions

- *Genome:* The sum total of genetic information of an individual which is encoded in structure of DNA
- *Genomics:* Is the study of human genome[Q]
- *Gene Therapy:* Introduction of a gene sequence into a cell to modify its behavior
- *DNA Technology:* Development of new diagnostic techniques such as restriction enzymes.

Eugenics and Euthenics

- *Eugenics (Sir Francis Galton[Q]):* Is a social philosophy which advocates the improvement of human hereditary traits through various forms of intervention (GENETIC MANIPULATION) [Q]
  - *Negative Eugenics*[Q]: Is aimed at lowering fertility among the genetically disadvantaged
    - Abortions
    - Sterilizations
    - Other methods of family planning
  - *Positive Eugenics*[Q]: Is aimed to encourage reproduction among the genetically advantaged
    - Financial and political stimuli
    - Targeted demographic analyses
    - In vitro fertilization,
    - Egg transplants
    - Gene cloning
- *Euthenics*: Deals with human improvement through altering external factors such as education and the controllable environment, including the prevention and removal of contagious disease and parasites, environmentalism, education regarding home economics, sanitation, and housing (Environmental Manipulation[Q]).

Mendelian Diseases Inheritance[Q]

Autosomal dominant traits[Q]	Autosomal recessive traits[Q]
Achondroplasia[Q] Huntington's chorea[Q] Neurofibromatosis[Q] Familial polyposis coli Marfan's Syndrome[Q] Retinoblastoma ABO blood group system[Q] Hyperlipoproteinemia I, II, III, IV Polycystic kidney Hereditary spherocytosis[Q]	Albinism[Q] Phenylketonuria[Q] Tay sachs disease Alcaptonuria[Q] Cystic fibrosis[Q] Galactosemia[Q] Hemoglobinopathies[Q] Maple syrup urine disease[Q] Megacolon (Hirschsprung Dis)
Sex-linked dominant traits[Q]	**Sex-linked recessive traits[Q]**
Vitamin-D resistant rickets Blood group Xg Familial hypophosphatemia	Hemophilia type A & B[Q] Duchenne muscular dystrophy Color blindness[Q] G6PD deficiency[Q] Hydrocephalus Retinitis pigmentosa

I

Hardy Weinberg fails if:
- Small populations
- Dynamic populations
- Non-random mating
- Assortative mating
- Mutations
- Natural selection
- Gene flow
- Genetic drift
- Migration

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Hardy Weinberg Law

- *Hardy Weinberg Law*[Q]*:* States that the genotype frequencies in a population remain constant or are in equilibrium from generation to generation unless specific disturbing influences are introduced
  - Genetic equilibrium (HW law) is a basic principle of population genetics; the entire principle is based on Mendelian genetics
  - HW law assumes that human population is static
- *Hardy Weinberg is only applicable for:*[Q]
  - Infinitely large populations
  - Random mating populations
  - Static populations
- *Hardy Weinberg fails if:*[Q]
  - Small populations
  - Dynamic populations
  - Non-random mating
  - Assortative mating
  - Mutations
  - Natural selection (mortality selection, fecundity selection)
  - Gene flow
  - Genetic drift
  - Migration.

Human Genome Project (HGP)

- *Human Genome Project:* HGP is an international scientific research project
  - Primary goals are *to determine the sequence of chemical base pairs which make up DNA and to identify the approximately 25,000 genes of the human genome*[Q] *(Now found 20,500 genes)*
  - *Secondary goals*: To understand human genome and complete a map of all findings
  - Goals of the original HGP were not only to determine more than *3 billion base pairs in the human genome*, but also to identify all the genes in this vast amount of data.
- *Project began in 1990 initially headed by James D. Watson:*
  - Ongoing sequencing led to the announcement of the essentially *complete genome in April 2003*[Q]
  - Part of the project is still ongoing, although a preliminary count indicates about *22,000–23,000 genes in the human genome*[Q]
- *The Human Genome Diversity Project (HGDP)*: A spinoff research aimed at mapping the DNA that varies between human ethnic groups, to date has yielded new conclusions. In the future, HGDP could possibly expose new data in disease surveillance, human development and anthropology. HGDP could unlock secrets behind and create new strategies for managing the vulnerability of ethnic groups to certain diseases. It could also show how human populations have adapted to these vulnerabilities.

Amniocentesis

- *Amniocentesis*: Examination of a sample of amniotic fluid makes possible the prenatal diagnosis of chromosomal anomalies and certain metabolic defects; The procedure can be used as early as 14th week of pregnancy when abortion of affected fetus is still feasible
  - *Culture and karyotyping of fetal cells* from amniotic fluid is used for diagnosis of fetal anomalies

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- *Biochemical analysis* of amniotic fluid is used for diagnosis of metabolic effects

- *Amniocentesis is indicated in following circumstances*[Q]:
  - A mother aged > 35 years (high risk of Down's Syndrome)
  - Patients who have had a child with Down's Syndrome or other chromosomal anomalies
  - Parents known to have chromosomal translocation
  - Patients who have had a child with metabolic defect
  - When sex-determination is warranted.

MENTAL HEALTH

Causes of Mental Health Disorders

- *Organic conditions:* Cerebral arteriosclerosis, neoplasma, metabolic diseases, endocrine diseases and chronic diseases (TB, leprosy, epilepsy)
- *Heredity*: Schizophrenia
- *Socio-pathological:* Worries, anxiety, emotional stress, tension, frustration, unhappy married life, broken homes, poverty, industrialization, urbanization, cruelty, rejection, neglct, etc.

I

MCC of DALYs lost: Unipolar depressive disorders[Q].
MCC of deaths: Alzheimer's and other dementias[Q].

Situational Analysis

- WHO analysis shows *a global point prevalence of neuro-psychiatric conditions is about 10%* for adult
- *MCC of DALYs lost*: Unipolar depressive disorders[Q]
- *MCC of deaths*: Alzheimer's and other dementias[Q]
- *Mental morbidity in India*: 18-20 per 1000[Q].

DALYs Lost due to Mental Health Disorders

Type of disorder	DALYs lost
Unipolar depressive disorders	64963
Alcohol disorders	18469
Schizophrenia	15686
Bipolar affective disorders	13645
Alzeihmer's dementia	12464
Migraine	7539
Epilepsy	7067

Diagnostic Criteria[Q]

- *DSM-IV Criteria:* Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision, DSM-IV-TR, is a manual published by the American Psychiatric Association (APA) that includes all currently recognized mental health disorders
- International Classification of Diseases, ICD-10 criteria.

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MULTIPLE CHOICE QUESTIONS

BMW MANAGEMENT

1. **What is the color-coding of bag in hospitals to dispose off human anatomical wastes such as body parts?** *[AIPGME 2005, PGMCET 2015]*
   (a) Yellow
   (b) Black
   (c) Red
   (d) Blue

2. **"Inertization" deals with:** *[AIIMS June 1998]*
   (a) Mixing biomedical waste with cement and other substance before disposal
   (b) Incineration of biomedical waste with cement and other substance before disposal
   (c) Dumping of Biomedical waste in sanitary landfills
   (d) Screw feed technology to disinfect sharps

3. **HIV (+) patient is being infused amphotericin B for fungal systemic infection patient's iv-cannula and tubing should be managed as which of the following:**
   (a) Disinfect in 1% hypo chlorite, put in blue bag for destruction/shredding *[AIIMS May 2006]*
   (b) Put in Red bag for destruction/shredding
   (c) Disinfect in 5% hypochlorite solution and put in yellow bag
   (d) Put in black bag for destruction/shredding

4. **What is the color-coding of bag in hospitals to dispose off human anatomical wastes such as appendix:**
   (a) Yellow *[AIIMS May 2004]*
   (b) Black
   (c) Red
   (d) Blue

5. **What is the color-coding of bag in hospitals to dispose off waste sharps?** *[AIIMS Nov 2000]*
   (a) Yellow
   (b) Black
   (c) Red
   (d) Blue

6. **Which of the following Categories of Biomedical wastes in India do not require containers/bags for disposal?**
   (a) Category 1 (Human anatomical waste)
   (b) Category 4 (Waste sharps) *[AIIMS Nov 2005]*
   (c) Category 5 (Discarded drugs and Cytotoxic medications)
   (d) Category 8 (Liquid waste)

7. **Incineration is:** *[AIPGME 2006]*
   (a) High temperature reduction process
   (b) Low temperature reduction process
   (c) High temperature oxidation process
   (d) Low temperature oxidation process

8. **Which of the following Biomedical wastes can be incinerated?** *[AIIMS Nov 2008]*
   (a) Pressurized gas containers
   (b) Radiographic wastes
   (c) PVC
   (d) Human anatomical wastes

9. **Which of the following Biomedical wastes cannot be disposed off in Yellow Bags?** *[AIIMS Nov 2007]*
   (a) Reactive chemical wastes
   (b) Human anatomical wastes
   (c) Microbiology and Biotechnology wastes
   (d) Dressings soiled with blood

10. **A known HIV positive patient is admitted in an isolation ward after an abdominal surgery following an accident. The resident doctor who changed his dressing the next day found it to be soaked in blood. Which of the following would be right method of choice of discarding the dressing?** *[AIIMS Nov 05, DPG 2011]*
    (a) Pour 1% hypochlorite on the dressing material and send it for incineration in an appropriate bag
    (b) Pour 5% hypochlorite on the dressing material and send it for incineration in an appropriate bag
    (c) Put the dressing material directly in an appropriate bag and send for incineration
    (d) Pour 2% Lysol on the dressing material and send it for incineration in an appropriate bag

11. **Yellow plastic bags containing biomedical wastes are treated by:** *[Karnataka 2008, UPSC CMS 2015]*
    (a) Autoclaving
    (b) Incineration
    (c) Microwaving
    (d) Shredding

12. **Hospital waste product accounts:** *[PGI June 04]*
    (a) Paper 40%
    (b) Plastic 10%
    (c) Infectious waste 30%
    (d) Rage 30%
    (e) Glass 4%

13. **True about composition of Indian hospital waste products:** *[PGI June 06]*
    (a) Metal 1%
    (b) Paper 15%
    (c) Glass 55
    (d) Infectious waste 3%
    (e) Plastics 3%

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14. Safe disposal of mercury is: *[AIIMS May 2009, 2010]*
(a) Collect carefully and recycle
(b) Controlled combustion
(c) Treatment with chemicals
(d) Deep burial

15. Outdated cytotoxic drugs are best disposed by:
(a) Disposa in municipal waste *[AIIMS Nov 09]*
(b) Destruction and dumping in secured landfill
(c) Store for months and burial
(d) Autoclave

16. All of the following statements regarding Biomedical Waste management are true *except*: *[AIPGME 2011]*
(a) Human Anatomical waste is thrown in Yellow bag
(b) Blue bag waste is disposed by Landfill
(c) Incineration ash is discarded in Black bag
(d) Material in Red bag could be a source of contamination

17. Incineration not done for: *[AIIMS May 2011]*
(a) Cytotoxic drugs
(b) Waste sharps
(c) Human anatomical waste
(d) Cotton contaminated by blood

18. Discarded expired medicines are thrown into:
(a) Blue bag *[Recent Question 2013]*
(b) Black bag
(c) Yellow bag
(d) Red bag

19. Not true about Screw feed technique is:
(a) 80% volume reduction *[AIIMS November 2013]*
(b) Pathological waste are removed
(c) Weight is decreased by 20-30%
(d) Based on non-burn thermal treatment

20. Discarded cytotoxic medicines should be disposed in:
(a) Blue bag *[DNB December 2010, MH 2007]*
(b) Black bag
(c) Red bag
(d) Yellow bag

21. Biomedical waste(s) to be discarded in Yellow Bag:
(a) Human anatomical waste *[PGI November 2012]*
(b) Animal waste
(c) Microbiological waste
(d) Wasted sharps
(e) Soiled waste

22. Incineration is done for: *[Recent Question 2013]*
(a) Waste sharps
(b) Human anatomical waste
(c) Radiographic waste
(d) Used batteries

23. Amount of infectious waste among hospital waste is:
(a) 1.5% *[Recent Question 2012]*
(b) 4.5%
(c) 25%
(d) 12%

24. Not safe disposal but good for soil building: *[Recent Question 2012] [Recent Question 2013]*
(a) Incineration
(b) Controlled tipping
(c) Composting
(d) Dumping

25. Disposal of placenta at PHC is: *[Recent Question 2012] [Recent Question 2013]*
(a) Dry burning
(b) Deep burial
(c) Boiling
(d) Treat with bleaching powder and burial

26. Plastic cover of syringes are disposed in: *[Recent Question 2013] [DNB December 2009] [DNB December 2011]*
(a) Red bag
(b) Yellow bag
(c) Black bag
(d) Blue bag

27. Waste sharps should be disposed in:
(a) Black bag *[DNB December 2010]*
(b) Yellow bag *[JIPMER 2014]*
(c) White bag
(d) Yellow bag

28. Which bag among the following shouldn't be incinerated as it contains cadmium?
(a) Blue *[DNB December 2010]*
(b) Red
(c) Black
(d) Yellow

29. Animal waste is disposed off by: *[Recent Question 2012]*
(a) Autoclaving
(b) Incineration
(c) Chemical treatment
(d) Microwaves

30. True about Incinerator is/are: *[PGI November 2012]*
(a) Red bag can be incinerated
(b) No pre-treatment required
(c) Yellow bag must be incinerated
(d) Sharps must not be incinerated
(e) Combustible matter must be above 30%

31. Incineration is not done for: *[PGI November 2013]*
(a) Anatomical waste
(b) Sharps waste
(c) Cytotoxic drugs
(d) Radioactive waste
(e) Animal waste

32. True about Inertization all *except*: *[AIIMS November 2014]*
(a) Mixing biomedical waste with cement
(b) Used for pharmaceutical waste
(c) Contaminates water sources
(d) Not useful for infectious waste

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33. **Disposal mechanism for Black colour coded biomedical waste bag is:** *[Recent Question 2014]*
    (a) Incineration
    (b) Dumping
    (c) Shredding
    (d) Landfill

34. **Category 7 on biomedical waste management contains:** *[Recent Question 2014]*
    (a) Soiled waste
    (b) Solid waste
    (c) Liquid waste
    (d) Incineration ash

35. **Incineration is done for BMW categories:** *[Recent Question 2015]*
    (a) 1 only
    (b) 3, 6, 7
    (c) 1, 2, 3
    (d) 1, 2, 3, 6

36. **Waste disposal of placenta after delivery is done by** *[UPSC CMS 2015]*
    (a) Disposing it in blue bags
    (b) Autoclaving
    (c) Incineration
    (d) Microwaving

37. **Disinfection and Mutilation-Shredding is treatment of choice and disposal for** *[NIMSET 2015]*
    (a) Solid waste
    (b) Sharps waste
    (c) Biotechnology waste
    (d) Human anatomical waste

Review Questions

38. **Black colour bag for:** *[UP 2006]*
    (a) Cat 1
    (b) Cat 3
    (c) Cat 4
    (d) Cat 5

39. **Biodegradable waste products, disposing in which of the colour code of the bags:** *[UP 2008]*
    (a) Blue
    (b) Black
    (c) Green
    (d) Yellow

40. **"3-D" means in hospital waste management is:** *[UP 2008]*
    (a) Disinfection, Disposal, Drainage
    (b) Discard, Disinfection, Drainage
    (c) Destruction, Deep burial, Drainage
    (d) Destruction, Deep burial, Disposal

41. **Color coding of bags in hospitals to dispose off human anatomical waste:** *[Kolkata 2008]*
    (a) Black
    (b) Yellow
    (c) Red
    (d) Blue

42. **According to the Biomedical Waste Rules (1998), for the hospital waste products disposed by incineration, the temperature of primary chamber of incineration should be:** *[MH 2005]*
    (a) 600 + /- 50°C
    (b) 800 + /- 50°C
    (c) 1000 + /- 50°C
    (d) 1200 + /- 50°C

43. **According to the BioMedical Waste (Management and Handling) Rules, 1998 of India, schedule II, the waste included in Category 4 are:** *[MH 2006]*
    (a) Human Anatomical Waste
    (b) Waste Sharps
    (c) Animal Waste
    (d) Microbiology and Biotechnology Waste

44. **According to biomedical waste, which of the following bag can be incinerated?** *[MH 2008]*
    (a) Red
    (b) Blue
    (c) Green
    (d) Yellow

45. **Incineration ash is seen in the category:** *[RJ 2008]*
    (a) 6
    (b) 3
    (c) 5
    (d) 9

46. **Soiled waste is seen in the category:** *[RJ 2009]*
    (a) 6
    (b) 3
    (c) 5
    (d) 9

DISASTER MANAGEMENT

47. **Post disaster (earthquake) in Pakistan, which of the following vaccines is recommended by WHO?** *[AIPGME 2005]*
    (a) Typhoid
    (b) Cholera
    (c) Tetanus
    (d) None of the above

48. **Chernobyl nuclear explosion accident occurred on 26th April, 1986. It resulted in emission of:** *[AIIMS Dec 1994]*
    (a) Methyl isocyanate (MI(C)
    (b) Union carbide
    (c) Ur235, Po210
    (d) I131, Cs134, Cs137, Sr90

49. **In draughts, commonly noticed vitamin deficiency is:** *[AIIMS Feb 1997]*
    (a) Vitamin A
    (b) Vitamin B
    (c) Vitamin C
    (d) Vitamin D

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50. Arrange the following phases of Disaster Cycle in a logical sequence: *[AIIMS Dec 1994]*
(a) Disaster impact–Mitigation–Rehabilitation–Response
(b) Disaster impact–Response–Rehabilitation– Mitigation
(c) Rehabilitation–Response–Disaster impact–Mitigation
(d) Response–Disaster impact–Rehabilitation– Mitigation

51. During a disaster, rapidly classifying the injured on the basis of likelihood of their survival with prompt medical intervention, is a part of: *[AIPGME 2000]*
(a) Search, rescue and first aid
(b) Triage
(c) Tagging
(d) Disaster mitigation

52. Most commonly reported disease in the post disaster period is: *[AIIMS May 2001]*
(a) Acute Respiratory Infections
(b) Gastroenteritis
(c) Tetanus
(d) Malaria

53. As per the most common classification of Triage system that is internationally accepted, the colour code that indicates high priority treatment or transfer is:
(a) Black *[Karnataka 2007]*
(b) Yellow *[Recent Question 2013]*
(c) Red
(d) Blue

54. Which colour-coded person is given first preference in disaster triage? *[AIIMS November 2013]*
(a) Red
(b) Black
(c) Yellow
(d) Green

55. Black color in triage is: *[Recent Question 2012] [Recent Question 2013]*
(a) Death
(b) Transfer
(c) High priority
(d) Low priority

56. Triage has how many colours: *[Recent Question 2012]*
(a) 2
(b) 3
(c) 4
(d) 5

57. All vaccines are NOT given in disaster, *except*:
(a) Cholera *[Recent Question 2013]*
(b) Tetanus
(c) Measles
(d) Tetanus

58. Which of the following is the nodal centre for disaster management? *[Recent Question 2013]*
(a) PHC
(b) CHC
(c) Police Control room
(d) District

59. True about triage is: *[Recent Question 2012]*
(a) Yellow-least priority
(b) Red-morbidity
(c) Green-ambulatory
(d) Blue-ambulatory

60. Which is the calamity with most amount of damage?
(a) Flood *[Recent Question 2013]*
(b) Earthquake
(c) Landslides
(d) Volcanoes

61. Natural disaster causing maximum deaths:
(a) Hydrological *[AIIMS May 2012]*
(b) Meterological
(c) Geological
(d) Fires

62. Triage is: *[Recent Question 2014] [NUPGET 2013]*
(a) A concept in trauma
(b) A method of breast lump diagnosis
(c) An investigation for duodenum and pancreas
(d) Management of old age health problems

63. Epidemics after disaster are caused by all *except*:
(a) Leptospirosis *[AIIMS November 2013]*
(b) Rickettsiosis
(c) Leishmaniasis
(d) Acute respiratory infection

64. The gas responsible for Bhopal gas tragedy was:
(a) Methyl isocyanate *[DNB June 2010]*
(b) Potassium isothiocyanate
(c) Sodium isothiocyanate
(d) Ethyl isothiocyanate

65. Which epidemic does not occur after a disaster?
(a) Leptospirosis *[AIIMS May 2014]*
(b) Leishmania
(c) ARTI
(d) Rickettsia

66. Nodal centre in case of disaster management:
(a) PHC *[Recent Question 2014]*
(b) Sub centre
(c) CHC
(d) District

67. During massive disaster what should be done first?
(a) Search and rescue, first aid *[Recent Question 2014]*
(b) Triage
(c) Stabilization of victims
(d) Hospital treatment and redistribution of patients to hospital if necessary

68. In a disaster management triage, patients who need surgery within 24 hours, are categorized under which color category: *[Recent Question 2014]*
(a) Red
(b) Green
(c) Blue
(d) Black

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Review Question

69. During disaster management the following condition would be classified under international code green signal: *[MP 2007]*
(a) High priority treatment
(b) Medium priority treatment
(c) Ambulatory patient
(d) Dead patients

OCCUPATIONAL HEALTH

70. Following occupational diseases are notifiable under the Indian Factory Act, 1976 *except*:
(a) Silicosis *[AIIMS June 1998]*
(b) Asbestosis
(c) Byssinosis
(d) Bagassosis

71. Ideal periodical examination of worker in an industry is done every: *[AIIMS Dec 1995]*
(a) Day
(b) Month
(c) Year
(d) Depends on type of exposure

72. Indian constitution has declared that children less than _____ years should not be employed in factories or mines:
(a) 10 *[AIIMS June1999]*
(b) 12
(c) 14
(d) 16

73. 'Safety officers' have to be appointed in factories where no. of workers is more than:
(a) 500 *[AIPGME 2001]*
(b) 1000
(c) 2000
(d) 5000

74. Useful screening test for lead is measurement of:
(a) Coproprophyrin in urine *[AIIMS Nov 1999]*
(b) Amino-laevulinic acid in urine
(c) Lead in blood
(d) Lead in urine

75. Lead poisoning in industries commonly occurs by:
(a) Inhalation *[AIIMS June 1999]*
(b) Ingestion
(c) Skin absorption
(d) Conjunctival route

76. Inhalation of sugarcane dust could cause:
(a) Bagassosis *[AP 1993, 2002, AIIMS Nov 2003]*
(b) Byssinosis *[MP 2002, Recent Question 2013]*
(c) Tobacosis *[DPG 2004, RJ 2003, DNB 2007, 2011]*
(d) Farmer's lung

77. All are features of Silico-tuberculosis *except*:
(a) High sputum AFB +ve *[AIPGME 2004]*
(b) Children of such cases do not get disease
(c) Impairement of total lung
(d) Nodular fibrosis

78. All are disease manifestations associated with Low Temperature *except*: *[AIPGME 2002]*
(a) Chilblains
(b) Prickles
(c) Frostbite
(d) Trench foot

79. Periodic Examination of factory workers is a type of:
(a) Primordial Prevention *[AIPGME 1993]*
(b) Primary Prevention
(c) Secondary Prevention
(d) Tertiary Prevention

80. With reference to lead poisoning, various parameters are given below with the levels: *[AIIMS Nov 2004]*
A. Coproporphyrin in urine
B. Aminolevulinic Acid in urine
C. Lead in urine
D. Lead in blood
I. > 70 mg/100 ml
II. > 5 mg/L
III. >150 mg/L
IV. > 0.8 mg/L
Correct match is:
(a) A-I B-II C-IV D-III
(b) A-III B-IV C-II D-I
(c) A-I B-IV C-II D-III
(d) A-III B-II C-IV D-I

81. The minimum air space per worker prescribed by Indian Factory (Amendment) Act, 1987 is:
(a) 200 cu ft *[AIPGME 1994, DNB 2011]*
(b) 300 cu ft
(c) 500 cu ft
(d) 700 cu ft

82. Maximum permissible level of whole body occupational exposure to ionizing radiation is: *[AIIMS Dec 1997]*
(a) 1 rem per year
(b) 3 rem per year
(c) 5 rem per year
(d) 15 rem per year

83. "White Fingers" may result from which of the following occupational hazards: *[AIIMS June 1998]*
(a) Heat
(b) Cold
(c) UV Radiation
(d) Vibration

84. Respirable dust, responsible for pneumo coniosis, has a size limit of: *[AIPGME 1993]*
(a) < 1 micron
(b) < 5 micron
(c) < 10 micron
(d) < 100 micron

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85. Which of the following Pneumoconioses are more prone to develop Tuberculosis? *[AIPGME 1991]*
(a) Silicosis
(b) Anthracosis
(c) Byssinosis
(d) Bagassosis

86. Which of the following Pneumoconioses is caused by Thermoactinomyces Sacchari? *[AIPGME 1998]*
(a) Silicosis
(b) Anthracosis
(c) Byssinosis
(d) Bagassosis

87. Which of the following Pneumoconioses is caused by Micropolyspora Faeni? *[AIPGME 1996]*
(a) Silicosis
(b) Byssinosis
(c) Farmer's lung
(d) Bagassosis

88. All are true about Lead Poisoning *except*: *[AIPGME 1995]*
(a) Greatest source is drinking water from lead pipes
(b) Can cause Blue Line on gums
(c) Measurement of CPU is a useful screening test
(d) Basophilic stippling of RBCs is a sensitive parameter of hematological response

89. Nearly 3/ 4th of occupational cancers are:
(a) Skin Cancer *[AIPGME 2008]*
(b) Lung Cancer
(c) Cancer Bladder
(d) Leukemias

90. Which of the following are associated with Bladder cancer: *[AIIMS May 2008]*
(a) Nickel
(b) Naphthylamines
(c) Arsenic
(d) Lead

91. Pre-placement examination has an important role to play in:
(a) Energy Conservation
(b) Occupational Health
(c) Genetic Counselling
(d) Mental Health

92. Under ESI Act, sickness benefit is given for a period of:
(a) 17 days *[AIPGME 1999, RJ 2006]*
(b) 39 days
(c) 91 days
(d) 117 days

93. Sickness absenteeism is a useful index to assess:
(a) Working environment *[AIIMS Nov 1999]*
(b) Sincerity of the workers
(c) Worker management relationship
(d) State of health of the workers

94. All of the following are true for occupational lead poisoning *except*: *[AIIMS Nov 02]*
(a) Inhalation is the most common mode of absorption
(b) Lead in blood and urine provide quantitative indicators of exposure
(c) Lead poisoning is not a notifiable disease
(d) Basophilic stippling is a sensitive parameter of hematological response

95. All of the following features are suggestive of asbestosis *except*: *[AIIMS May 2003]*
(a) Occurs within five years of exposure
(b) The disease progresses even after removal of contact
(c) Can lead to pleural mesothelioma
(d) Sputum contains asbestos bodies

96. Bagassosis can be prevented by spraying: *[DPG 2005]*
(a) 10% acetic acid
(b) 5% acetic acid
(c) 1% propionic acid
(d) 2% propionic acid

97. According to "Factory Act, 1948" maximum permissible working hours per week are:
(a) 48 *[DPG 2007]*
(b) 60
(c) 72
(d) 54

98. The Financial contribution for ESI comes from:
(a) State government *[Karnataka 2008]*
(b) Central government
(c) Employers'
(d) All of the above

99. Following are the chemical agents, which causes occupational dermatitis by local irritation *except*:
(a) Rubber *[Karnataka 2009]*
(b) X-rays
(c) Lime
(d) Ether

100. Most common mode of lead poisoning is:
(a) Ingestion *[AIIMS May 2009]*
(b) Dermally
(c) Inhalation
(d) Faecal-oral

101. Which occupational exposure may cause sterility in females: *[Recent Question 2012]*
(a) Lead
(b) Carbon monoxide
(c) Mercury
(d) Agricultural insecticides

102. Chairman for ESI in India is: *[Recent Question 2014]*
(a) Prime Minister
(b) Union Minister of Health & Family Welfare
(c) Union Minister of Labour
(d) Union Minster of Human Resource Development

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103. True about ESI act 1948: *[Recent Question 2014]*
(a) Applicable on educational institutions also
(b) Employer employee contribution is 1.75%
(c) Maternity benefit for 3 months
(d) Beneficiaries are those having income with> 15000/ month

104. False about ESI in India: *[AIIMS November 2014]*
(a) Centre contribute 7/8 and State contribute 1/8 part on expenditure
(b) A worker with income less than 70/- per day has to pay only 300/- per month
(c) Funeral expenses is 50,000/-
(d) Medical benefit include full medical care

105. Under ESI Act, number of units for which a Family Dispensary must be opened is *[Recent Question 2015]*
(a) 500
(b) 1000
(c) 1500
(d) 2000

106. Occupational exposure to Benzol may lead to
(a) Lung cancer *[UPSC CMS 2015]*
(b) Leukaemia
(c) COPD
(d) Neurofibromas

107. The benefits of ESI Act include the following *except*:
(a) Medical benefit *[UPSC CMS 2015]*
(b) Rehabilitation allowance
(c) Sickness benefit
(d) Nutritional allowance

Review Questions

108. The extended sickness benefit is given for:
(a) 309 days *[DNB 2002]*
(b) 409 days
(c) 365 days
(d) 490 days

109. Byssinosis is seen in: *[DNB 2003]*
(a) Cement factories *[Recent Question 2013]*
(b) Textile industries
(c) Iron factories
(d) Grain fields

110. Bagassosis occurs with: *[DNB 2004]*
(a) Cotton
(b) Surgarcane fibres
(c) Carbon particles
(d) Silica fibres

111. Silicosis occurs with: *[DNB 2007]*
(a) Cotton
(b) Sugarcane fibres
(c) Carbon particles
(d) Silica fibres

112. A person working in hot environment who consumes more H_2O without salt is likely to develop: *[DNB 200]*
(a) Heat stroke
(b) Heat cramps
(c) Heat exhaustion
(d) Heat hyperpyrexia

113. In ESI prograance, state goverment employee contribute to the fund. Employer's contribution is:
(a) 5.75% *[DNB 2008]*
(b) 4.75%
(c) 3.75%
(d) 2.75%

114. Benzene is associated with cancer of: *[UP 2001]*
(a) Skin
(b) Lung
(c) Bladder
(d) Leukemia

115. Wrist drop may be caused as industrial hazard in:
(a) Battery industry *[UP 2001]*
(b) Gas industry
(c) Asbestos, industry
(d) Aniline industry

116. "Snow-storm" appearance are seen in:
(a) Anthracosis *[UP 2006]*
(b) Silicosis
(c) Byssinosis
(d) Bagassosis

117. Exposure to cotton dust causes:
(a) Byssinosis *[Karnataka 2000, AP 2002, RJ 2006]*
(b) Bagassosis
(c) Silicosis
(d) Asbestosis

118. ESI Act includes all the following *except*: *[AP 2006]*
(a) Small power using factories employing 10-19 persons
(b) Non power using factories employing 20 or more person
(c) Newspaper establishment
(d) Defence establishment

119. All are covered under ESI *except*: *[AP 2008]*
(a) News paper workers
(b) Non power using factories with 18 members
(c) Small power using factories with 18 members
(d) Non power using factories with 20 members

120. Monday fever is associated with:
(a) Bagassosis *[NIMHANS 1984] [TN 2003]*
(b) Byssinosis
(c) Asbestosis
(d) Silicosis

121. Silicosis affects: *[TN 2005]*
(a) Lower lobes of lungs
(b) Both
(c) Hilum of lungs
(d) Upper lobes of lungs

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122. Respirable dust for pneumoconiosis: *[Kolkata 2004]*
(a) 0.1–5 m
(b) 5–10 m
(c) 10–15 m
(d) 15–20 m

123. Dust particle, in a industry is a: *[Kolkata 2005]*
(a) Biological hazards
(b) Chemical hazards
(c) Physical hazards
(d) Mechanical hazards

124. Which of these is true regarding factories act: *[MP 2004]*
(a) It is applicable in establishment employing 20 or more workers where power is used or <20 workers where power is not used
(b) 500sq feet minimum space required per person
(c) Act has prescribed a maximum of 48 working hrs per week, not exceeding 10 hrs per day
(d) Act applies to the whole of India including Jammu and Kashmir

125. A 40-year-old man working in a coal mine since 15 years developed couth, dyspnoea on exertion and chest pain. His X-ray showed "snow – storm" appearance in lung fields. The most likely diagnosis is:
(a) Anthracosis *[MP 2008]*
(b) Silicosis
(c) Asbestosis
(d) Siderosis

126. By the Factory Act the age for the child to work should minimum be (in years): *[MH 2000]*
(a) 14
(b) 16
(c) 18
(d) 21

127. Which of the following is occupational lung disease but not pneumoconiosis? *[MH 2003]*
(a) Brucellosis
(b) Silicosis
(c) Anthracosis
(d) Byssinosis

128. According to the factory Act (1948), minimum space each worker should have in a factory (in Cu.ft.) is: *[MH 2005]*
(a) 100
(b) 200
(c) 400
(d) 500

129. Which of the following is not a advantage for employers under ESI act? *[MH 2005]*
(a) Extemption from Maternity Benefit ACT 1961
(b) Rebate under Income Tax Act on contribution deposited in ESI scheme
(c) Exemption from payment of medical allowance to employess and their dependants or arranging for their medical care
(d) Exemption from sales tax

130. What are the maximum permissible working hours (in work/person/week) according to the factory act?
(a) < 42 hours *[MH 2006]*
(b) < 48 hours
(c) < 56 hours
(d) < 60 hours

131. Particle size (in micron) at which the dust particles gets lodged in the respiratory tract?
(a) 5-10 *[MH 2008]*
(b) 0.5-3
(c) 0.5-0.1
(d) 3-5

132. Under ESIS act, the state government's share of expenditure on medical care is? *[MH 2008]*
(a) 1/8
(b) 3/8
(c) 5/8
(d) 7/8

133. Minimum duration to developing coal minor pneumoconiosis: *[RJ 2000]*
(a) 2-4 years
(b) 4-6 years
(c) 8 years
(d) > 10 years

134. Which is not included in pneumoconiosis? *[RJ 2001]*
(a) Byssinosis
(b) Bagassosis
(c) Anthracosis
(d) Psittacosis

135. Occupational exposure that may cause sterility in females: *[Recent Question 2012]*
(a) Aniline
(b) Lead
(c) Radon
(d) Nickel

136. The clinical symptoms of lead toxicity are associated with blood levels of: *[DNB 2008]*
(a) 30 mcg/100ml blood
(b) 40 mcg/100ml blood
(c) 50 mcg/100ml blood
(d) 70 mcg/100ml blood

137. In ESI programme, state govt, employees contribute to the fund. Employer's contribution is: *[DNB 2008]*
(a) 5.75%
(b) 4.75%
(c) 3.75%
(d) 2.75%

138. Thermoactinomyces sacchari causes:
(a) Bagassosis *[Recent Question 2013]*
(b) Siderosis
(c) Byssinosis
(d) Anthracosis

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139. Ergonomics is: *[Recent Question 2013]*
(a) Adjusting the Worker to his job
(b) Study of human behaviour
(c) Study of social mobility
(d) Study of health of female workers

140. Sickness benefit under ESI act extended into:
(a) 91 days *[DNB December 2011]*
(b) 61 days
(c) 1 year
(d) 2 years

141. Most common heavy metal poisoning in the world:
(a) Lead *[Recent Question 2013]*
(b) Arsenic
(c) Mercury
(d) Cadmium

142. All are occupational cancers *except*:
(a) Liver ca *[Recent Question 2012]*
(b) Bladder ca
(c) Lungs ca
(d) Breast ca

143. Which of the following is true about ESI Act (1948)? *[AIIMS November 2013]*
(a) Funeral charges put up to Rs. 50,000/-
(b) State government share is 1/8 and ESI Corporation is 7/8
(c) Employee contributes 8.75% and employer 3.75%
(d) Maximum limit for each family member is Rs. 30,000/-

144. According to The Workmen's Compensation Act, 1992, which of the following is considered an occupational disease? *[AIIMS May 2012]*
(a) Typhoid
(b) Anthrax
(c) Tetanus
(d) Dengue

145. Main cause of Farmer's lung is due to microorganism:
(a) Pneumococcus *[NUPGET 2013]*
(b) Mycobacterium tuberculosis
(c) Micropolyspora faeni
(d) Staphylococcus aureus

146. Under ESI, a benefit which is NOT given in cash:
(a) Sickness benefit *[NUPGET 2013]*
(b) Medical benefit
(c) Maternity benefit
(d) Dependents' benefit

147. Which is/are not true of ESI Act, 1948? *[PGI November 2012]*
(a) Involves those working in restaurants
(b) 100% wages in temporary disability
(c) Extended sickness benefit 91 days
(d) Workers pay 1.75% of income
(e) Run by Central government

GENETICS

148. Hardy Weinberg law is related to: *[AIIMS May 2005]*
(a) Gene therapy *[Recent Question 2012]*
(b) Human genome project
(c) Population genetics
(d) Eugenics

149. The primary goal of Human Genome Project has been: *[AIIMS Nov 2004]*
(a) Introduction of a gene sequence into a cell to modify its behavior
(b) Development of new diagnostic techniques such as restriction enzymes
(c) Identify genes and sequence of base pairs in DNA of human genome
(d) Confirmation of Hardy Weinberg Law

150. Amniocentesis to detect chromosomal abnormalities can be done as early as: *[AIIMS Nov 2000]*
(a) 14th week of gestation
(b) 18th week of gestation
(c) 22nd week of gestation
(d) 26th week of gestation

151. Haemophilia is a genetic disorder of coagulation seen only in males. It is transmitted as: *[AIIMS Nov 2005]*
(a) X-linked dormant
(b) Y-linked dormant
(c) X-linked recessive
(d) Autosomal recessive

152. Environmental Manipulation which enable genes to express themselves readily is known as:
(a) Positive Eugenics *[AIPGME 1998]*
(b) Negative Eugenics
(c) Euthenics
(d) Genetic Counselling

153. In post disaster phase, for ensuring safe water supply, it is advisable to have a Residual Chlorine Level of:
(a) 0.3 mg/litre *[AIPGME June 1997]*
(b) 0.5 mg/litre
(c) 0.7 mg/litre
(d) 3.0 mg/litre

154. Polygenic inheritance seen in: *[AIIMS May 99]*
(a) Hypertension
(b) HOCM
(c) Manic depressive psychosis
(d) Familial hyper lipidemia

155. Which of the following does not affect Hardy Weinberg Equation? *[AIIMS November 2011]*
(a) Small population
(b) Natural selection
(c) Mutation
(d) Assortative mating

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156. All of the following disorders are Autosomal dominant *except*: *[AIPGME 2012]*
(a) Neurofibromatosis
(b) Retinoblastoma
(c) Marfan's syndrome
(d) Ataxia telengiectasia

157. Marriage between two heterozygous individuals for the same disorder is prevented by *[UPSC CMS 2015]*
(a) Retrospective genetic counselling
(b) Prospective genetic counselling
(c) Legislation
(d) Mass health education

Review Questions

158. "Eugenics" is: *[TN 2005]*
(a) The study of hereditary improvement of the human race by controlled selective breeding
(b) The humane destruction of an animal accomplished by a method that produces rapid unconsciousness and subsequent death without evidence of pain or distress, or a method that utilizes anaesthesia produced by an agent that causes painless loss of consciousness and subsequent death
(c) A feeling of well-being or elation, may be drug related
(d) A state of being carried away by overwhelming emotion

159. Following are correct about Autosomal recessive *except*: *[TN 2005]*
(a) Both boy and girl are affected
(b) Heterozyte are not affected
(c) Most disorders of inborn errors of metabolism come under this group
(d) Affect more people in later age group than children

160. Population genetics is related with: *[MH 2005]*
(a) Mandelian law
(b) Watson anc Crick model
(c) Hardy Weinberg law
(d) Weigert Meyer rule

161. "Founder effect" describes the distribution of diseases on the basis of? *[MH 2008]*
(a) Occupation
(b) Environment
(c) Genetics
(d) All of the above

162. All of the following affect the equilibrium in Hardy-Weinberg's law, *except*: *[AIIMS May 2012]*
(a) Small population
(b) Random mating
(c) Mutations
(d) Gene outflow

163. Which is/are NOT X-linked disorders? *[PGI May 2012]*
(a) Wilson's disease
(b) Haemophilia
(c) Thalassemia
(d) G6PD deficiency
(e) ABO blood groups system

164. Effect of environment on genes is called:
(a) Positive Eugenics *[Recent Question 2012]*
(b) Negative Eugenics
(c) Euthenics
(d) Ergonomics

MENTAL HEALTH

165. Most commonly abused agent in India:
(a) Cannabis indica *[AIIMS May 07]*
(b) Tobacco *[Recent Question 2015]*
(c) Heroine
(d) Amphetamine

166. Which one of the following is not a socio-pathological factor associated with mental illness?
(a) Emotional stress *[AIIMS Nov 1999]*
(b) Frustration
(c) Endocrine diseases
(d) Anxiety

167. Maximum loss of DALY occurs in which psychiatric disorder? *[DPG 2007]*
(a) Schizophrenia
(b) Depression
(c) Alcohol dependence
(d) Bipolar disorder

MISCELLANEOUS

168. Under passive surveillance for tuberculosis, indication for sputum microscopy cough is for weeks or more:
(a) 3 weeks *[MH 2005]*
(b) 4 weeks
(c) 6 weeks
(d) 8 weeks

169. Punnet's square is used for: *[AIPGME 2011]*
(a) Random sampling
(b) Statistical analysis
(c) Finding genotype of offspring
(d) Test of significance

170. Best way to dispose e-waste is: *[DNB December 2010]*
(a) Burning
(b) Incineration
(c) In a landfill
(d) Recycling

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EXPLANATIONS

BMW MANAGEMENT

1. Ans. (a) Yellow *[Ref. BMW Management in India by Dr. J. Kishore and Dr. G. K. Ingle, 1/e p26-28, Park 23/e p793-794]*

BIOMEDICAL WASTE MANAGEMENT:

- Biomedical Wastes (BMW) in India are handled and managed under 'Biomedical Waste Management (Management and Handling) Rules, 1998'
- The exercising powers are conferred under Sections 6, 8, 25 of 'Environmental (Protection) Act, 1986' (under the Ministry of Environment and Forests)
- *Categories of Bio medical wastes (BMW) (Schedule I):*

Cat	BMW	Wastes included
1.	*Human Anatomical Waste*	Human tissues, organs, body parts
2.	*Animal Waste*	Animal tissues, body parts, organs, carcasses, fluids, blood
3.	*Microbiology and Biotechnology Waste*	Waste from lab cultures, stocks, specimens of microorganisms, live or attenuated vaccines, cell cultures (human/animal), wastes from production of biologicals, toxins
4.	*Waste Sharps*	Needles, syringes, blades, scalpels, glass
5.	*Discarded Medicines and Cytotoxic Drugs*	Outdated contaminated and discarded medicines
6.	*Soiled Waste*	Items contaminated with blood, and fluids, including cotton, dressings, soiled plaster casts, linen, beddings
7.	*Solid Waste*	Disposable items (except sharps) including tubings, catheters, intravenous sets
8.	*Liquid Waste*	Waste generated from lab and washing, cleaning, housekeeping and disinfecting activities
9.	*Incineration Ash*	Ash from incineration of any BMW
10.	*Chemical Waste*	Chemical used in disinfection (insecticides) or in production of biologicals

- *Colour coding and Type of container for BMW disposal (Schedule II):*

Color coding	Type of container	BMW category	Treatment option
Yellow	Plastic bag	1, 2, 3, 6	Incineration/deep burial
Red	Disinfected container/Plastic bag	3, 6, 7	Autoclave/Microwave/Chemical treatment
Blue/White translucent	Plastic bag	4, 7	Autoclave/Microwave/Chemical treatment and Destruction/Shredding
Black	Plastic bag	5, 9, 10 (solid)	Secured landfill

2. Ans. (a) Mixing biomedical waste with cement and other substance before disposal *[Ref. Park 23/e p792]*

- *The process of 'Inertization'* involves mixing biomedical waste with cement and other substance before disposal, so as to minimize risk of toxic substances contained in waste to contaminate ground/surface water. Inertization is especial-lysuitable for pharmaceuticals and for incineration ashes with high metal content
- *A typical composition of mixture is:*
  - 65% pharmaceutical waste
  - 15% lime
  - 15% cement
  - 5% water

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Also Remember

- *Advantage of Inertization:* Relatively inexpensive
- *Disadvantage of Inertization:* Not applicable to infectious waste.

3. **Ans. (a) Disinfect in 1% hypo chlorite, put in blue bag for destruction /shedding** *[Ref. Park 23/e p793-794]*
   - Intravenous cannula and tubing are included in BMW category 7 (Solid Waste). It is disposed off in blue/white translucent bag (preferable is metal containers which are puncture-proof)
4. **Ans. (a) Yellow** *[Ref. Park 23/e p793-794]*
   - Human anatomical wastes (BMW Cat. 1) such as body parts, tissues and organs are disposed off in Yellow bag
   - Amputations, cholecystectomised gall bladder, appendix (post appendicectomy) are included in human anatomical wastes
5. **Ans. (d) Blue** *[Ref. Park 23/e p793-794]*
   - Wasted sharps (scalpels, needles, syringes, blades, glass) are included in BMW Category 4 (Schedule I). Category 4 wastes are disposed off in Blue/White translucent bag (Schedule II)

Also Remember

- *Schedules under Biomedical Waste Management (Management and Handling) Rules, 1998:*
  - *Schedule I:* Categories of BMW, treatment and disposal
  - *Schedule II:* Color coding and type of container for BMW disposal
  - *Schedule III:* Labels for BMW containers/bags
  - *Schedule IV:* Label for transport of BMW containers/bags
  - *Schedule V:* Standards for treatment and disposal of BMW

6. **Ans. (d) Category 8 (Liquid waste)** *[Ref. Park 23/e p793]*
   - According to Schedule II of Biomedical Waste (Management and Handling) Rules, 1998, following categories do not require containers/bags for disposal:
     - Categories 8 and 10 (liquid)
     - Category 3 (if disinfected locally).

Also Remember

- Chemical treatment with 'at least 1 % hypochlorite solution' for category 8 and 10.

7. **Ans. (c) High temperature oxidation process** *[Ref. Park 23/e p790-791]*

INCINERATION

- *Incineration:* Is a 'high temperature dry oxidation' process; It leads to significant reduction in waste-volume and weight (up to 70 – 80%)
- Incineration does not require pre-treatment
- *Biggest disadvantage of incineration:* Generation of smoke
- *Types of Incinerators:*
  - Double-chamber pyrolytic
  - Single-chamber pyrolytic
  - Rotary kilns
- *Temperature in an incinerator:*
  - Primary chamber: 800° ± 50°C
  - Secondary chamber: 1050° ± 50°C

Also Remember

- *Characteristics of wastes suitable for incineration:*
  - Low heating volume
  - Combustible matter > 60%
  - Non-combustible solids < 5%
  - Non-combustible fines < 20%
  - Moisture content < 30%

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- Red bags should not be incinerated as they contain cadmium (heavy metal).

8. **Ans. (d) Human anatomical wastes** *[Ref. Park 23/e p790-794]*
   - *Wastes types not-to-be incinerated:*
     - Pressurized gas containers
     - Reactive chemical wastes (large)
     - Silver/Radiographic/photographic wastes
     - Halogenated plastics (PVC)
     - Wastes with high mercury/cadmium content
     - Sealed ampoules/ampoules with heavy metals.

Also Remember

- Human anatomical wastes can be treated/disposed by incineration or deep burial.

9. **Ans. (a) Reactive chemical wastes** *[Ref. Park 23/e p794]*
   - *Yellow color bags are used for disposal of:*
     - BMW Cat. 1: Human anatomical wastes
     - BMW Cat. 2: Animal waste
     - BMW Cat. 3: Microbiological and biotechnology waste
     - BMW Cat. 6: Soiled waste
   - *Container/bags are NOT required for disposal of:*
     - BMW Cat. 8: Liquid waste
     - BMW Cat. 10: Chemical waste
     - BMW Cat. 3 (if disinfected locally): Microbiological and biotechnology waste
10. **Ans. (a) Pour 1% hypochlorite on the dressing material and send it for incineration in an appropriate bag** *[Ref. Internet, Park 23/e p793-794]*
    - All HIV infected material, i.e. gauge pieces, bandages, cotton swabs, blood units, blood have to be incinerated
11. **Ans. (b) Incineration** *[Ref. Park 23/e p790-791]*
12. **Ans. (b) Plastic 10%; (e) Glass 4%** *[Ref. Park 23/e p790]*
    - Average composition of Hospital waste products in India:
      - Paper: 15%
      - Plastic: 10%
      - Rags: 15%
      - Metals (Sharps, etc): 1.0%
      - Infectious waste: 1.5%
      - Glass: 4.0%
      - General waste (food waste, sweeping of premises): 53.5%
13. **Ans. (a) Metal 1%; (b) Paper 15%** *[Ref. Park 23/e p790]*
14. **Ans. (a) Collect carefully and recycle** *[Ref. Guidelines for environmentally sound mercury management in fluorescent lamp sector, CPCB, India]*

    MERCURY DISPOSAL:
    - Dispose mercury as a hazardous waste
    - 'Never combine it with organic or inorganic waste
    - Never dispose it in sink/drain
    - Dispose off in 'Recycling units'
15. **Ans. (b) Destruction and dumping in secured landfill** *[Ref. Park 23/e p793-794]*
16. **Ans. (b) Blue bag waste is disposed by Landfill** *[Ref. Park 23/e p793-794]*
17. **Ans. (b) Waste sharps** *[Ref. Park 23/e p793-794]*
18. **Ans. (b) Black bag** *[Ref. K Park 23/e p794]*
19. **Ans. (b) Pathological waste are removed** *[Ref. K Park 23/e p791]*

    SCREW-FEED TECHONOLOGY
    - *Principle*: Non-burn dry thermal process

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- *Process*:
  - Shredding of waste
  - Heating in a rotating auger
- *Reduction in waste*:
  - Reduction in weight: 20-35%
  - Reduction in volume: 80%
- *Useful for wastes*:
  - Infectious waste
  - Sharps
- *Not useful for wastes*:
  - Pathological waste
  - Cytotoxic waste
  - Radioactive waste

20. **Ans. (b) Black bag** *[Ref. K Park 23/e p794]*
21. **Ans. (a) Human anatomical waste; (b) Animal waste; (c) Microbiological waste; (e) Soiled waste** *[Ref. K Park 23/e p794]*
22. **Ans. (b) Human anatomical waste** *[Ref. K Park 23/e p794]*
23. **Ans. (a) 1.5%** *[Ref. K Park 23/e p790]*
24. **Ans. (c) Composting** *[Ref. K Park 23/e p755]*
25. **Ans. (d) Treat with bleaching powder and burial** *[Ref. Essentials of Community Health Nursing Practice by Kamalam, 1/e p226]*
26. **Ans. (c) Black bag** *[Ref. BMW Management Guidelines 2011, Government of India]*
27. **Ans. (c) White bag** *[Ref. K Park 23/e p794]*
28. **Ans. (b) Red** *[Ref. Waste Incineration and Public Health, National Research Council, p26]*
29. **Ans. (b) Incineration** *[Ref. K Park 23/e p793-794]*
30. **Ans. (c) Yellow bag must be incinerated; (d) Sharps must not be incinerated** *[Ref. K Park 23/e p790-791]*
31. **Ans. (b) Sharps waste; (c) Cytotoxic drugs; (d) Radioactive waste** *[Ref. Park 23/e p790-791]*
32. **Ans. (c) Contaminates water sources** *[Ref. Park 23/e p792]*
33. **Ans. (d) Landfill** *[Ref. Park 23/e p 793-794]*
34. **Ans . (b) Solid waste** *[Ref. Park 23/e p 793-794]*
35. **Ans . (d) 1, 2, 3, 6** *[Ref. Park 23/e p794]*
36. **Ans . (c) Incineration** *[Ref. Park 23/e p793-794]*
37. **Ans . (b) Sharps waste** *[Ref. Park 23/e p794]*

Review Questions

38. **Ans. (d) Cat 5** *[Ref. Park 23/e p793]*
39. **Ans. (d) Yellow** *[Ref. Park 23/e p794]*
40. **Ans. (a) Disinfection, Disposal, Drainage** *[Ref. Internet]*
41. **Ans. (b) Yellow** *[Ref. Park 23/e p794]*
42. **Ans. (b) 800 + /- 50°C** *[Ref. Community Medicine by AP Kulkarni, 2/e p 246]*
43. **Ans. (b) Waste Sharps** *[Ref. Park 23/e p793]*
44. **Ans. (d) Yellow** *[Ref. Park 23/e p794]*
45. **Ans. (d) 9** *[Ref. Park 23/e p793]*
46. **Ans. (a) 6** *[Ref. Park 23/e p793]*

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DISASTER MANAGEMENT

47. Ans. (d) None of the above *[Ref. Park 23/e p797]*

- WHO does not recommend Typhoid, Cholera and Tetanus Toxoid vaccinations in routine use in endemic areas post-disaster
  - However, these vaccinations are recommended for health workers
- Because measles can deplete Vitamin A stores in children, 'measles is the highest priority among vaccinations for children' living in congregate care after a disaster

Also Remember

- *Clean water supply in post-disaster phase:* UNHCR recommends 15 liters/person/day clean water be provided
- *A common micronutrient deficiency in disasters is Vitamin A deficiency:* It occurs due to deficient relief diets, measles and diarrhea (gastroenteritis)
- Other common deficiencies include scurvy (Vitamin C), anemia (iron) and pellagra (Vitamin B4 –niacin)

48. Ans. (d) I131, Cs134, Cs137, Sr90 *[Ref. K. Park 23/e p801]*

- Chernobyl nuclear explosion accident occurred on 26th April, 1986 in Russia (now Ukraine)
  - It resulted in emission of I131, Cs134, Cs137, Sr90
- Chernobyl nuclear explosion accident is the 'largest accidental release of radioactive material in the history of nuclear power'
- It is the only instance so far of level 7 on the International Nuclear Event Scale for nuclear accidents

Also Remember

- *World's worst man-made disaster is Bhopal gas Tragedy, 3rd December 1984:*
  - Methylisocyanate (MIC) gas leaked from Union Carbide pesticide plant in Bhopal, India
  - It resulted in resulting in the death of about 3,000 people according to the Indian Supreme Court
  - *Fukushima Daichii Tragedy, 11 March 2011:* I_{131}, Cs_{134}, Cs_{137}.

49. Ans. (a) Vitamin A *[Ref. Epidemiology of malnutrition in disasters by Clinton Coil, 2nd Vol; p4]*

- A common micronutrient deficiency in disasters is Vitamin A deficiency: It occurs due to deficient relief diets, measles and diarrhea (gastroenteritis)
- Other common deficiencies include scurvy (Vitamin C), anemia (iron) and pellagra (Vitamin B4 – niacin).

50. Ans. (b) Disaster impact – Response – Rehabilitation – Mitigation *[Ref. Park 23/e p795-796]*

Also Remember

- Disaster (Colin Grant): Is catastrophe causing 'injury or illness simultaneously to at least 30 people', who will require hospital emergency treatment
- For every 1 disaster registered (in official database), there are 20 other unacknowledged smaller emergencies with destructive impact
- During the phase of search, rescue and first aid, most immediate help cover is derived from uninjured survivors
- 'Most crucial phase of disaster management' is the stage of health and medical relief
- World Disaster Reduction Day: 2nd Wednesday of October
- Greatest need for emergency care in immediate post disaster occurs in first few hours.

51. Ans. (b) Triage *[Ref. Park 23/e p796]*

- *Triage:* Consists of rapidly classifying the injured 'on the basis of severity of their injuries and likelihood of their survival' with prompt medical intervention
- First come first serve is NOT followed in emergencies
- *Triage sieve:* Quick survey to separate the dead and the walking from the injured
- *Triage sort:* Remaining casualties are assessed and allocated to categories
- *Triage system:* Most commonly uses FOUR color code system:
  - Red (Highest Priority): Immediate resuscitation or limb/life saving surgery in next 6 hours
  - Yellow (High Priority): Possible resuscitation or limb/life saving surgery in next 24 hours

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  - Green (Low Priority): Minor illness/ambulatory patients
  - Black (Least Priority): Dead and moribund patients
- *Tagging:* Is the procedure where identification, age, place of origin, triage category, diagnosis and initial treatment are tagged on to every victim of disaster through a colour coding
- *Mitigation:* Measures designed to either prevent hazards from causing emergency or to lessen the effects of emergency.

Also Remember

TRIAGE:
- Triage yields best results when carried out at the site of disaster
- *Triage is of two types:*
  - Simple triage: Simple triage is used in a scene of mass casualty, in order to sort patients into those who need critical attention and immediate transport to the hospital and those with less serious injuries.
    1. This step is required before transportation becomes available
    2. The categorization of patients based on the severity of their injuries can be aided with the use of printed triage tags or colored flagging
  - *Rapid triage:* S.T.A.R.T. (Simple Triage and Rapid Treatment) is a simple triage system that can be performed by lightly-trained lay and emergency personnel in emergencies.
    1. It is not intended to supersede or instruct medical personnel or techniques
    2. It may serve as an instructive example
    3. It has been field-proven in mass casualty incidents such as train wrecks and bus accidents
- *Reverse Triage:* In addition to the standard practices of triage as mentioned above, there are conditions where sometimes the less wounded are treated in preference to the more severely wounded. This may arise in,
  - A situation such as war where the military setting may require soldiers be returned to combat as quickly as possible
  - Disaster situations where medical resources are limited in order to conserve resources for those likely to survive but requiring advanced medical care.

52. Ans. (b) Gastroenteritis *[Ref. Park 23/e p797]*
- Most commonly reported disease in post-disaster phase is Gastroenteritis
- Most practical and effective strategy of disease prevention and control in post-disaster phase is 'supplying safe drinking water and proper disposal of excreta'
- Foremost step for disease prevention and control in post-disaster phase is chlorination of all water bodies
- Level of residual chlorine to be maintained in all water bodies in post-disaster phase is > 0.7 mg/l (> 0.7 ppm)

Also Remember

- *A common micronutrient deficiency in disasters is Vitamin A deficiency:* It occurs due to deficient relief diets, measles and diarrhea (gastroenteritis)
  - Other common deficiencies include scurvy (Vitamin C), anemia (iron) and pellagra (Vitamin B4 –niacin).

53. Ans. (c) Red *[Ref. K. Park 23/e p796]*
- *Categories in Triage:*

Category	Tagging colour	Priority
I	Red	High
II	Yellow	Medium
III	Green	Low
IV	Black	Least

54. Ans. (a) Red *[Ref. K Park 23/e p796]*

55. Ans. (a) Death *[Ref. K Park 23/e p796]*

56. Ans. (c) 4 *[Ref. K Park 23/e p796]*

57. Ans. (c) Measles *[Ref. K Park 23/e p797]*

58. Ans. (d) District *[Ref. National Disaster Management Authority, Delhi website]*

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59. **Ans. (c) Green-ambulatory** *[Ref. K Park 23/e p796]*

60. **Ans. (a) Flood** *[Ref. National Disaster Management Authority, Delhi website]*

61. **Ans. (a) Hydrological** *[Ref. National Disaster Management Authority, Delhi website]*

62. **Ans. (a) A concept in trauma** *[Ref. K Park 23/e p796]*

63. **Ans. (c) Leishmaniasis** *[Ref. K Park 23/e p797]*
Diseases common in Post-disaster Phase
- Gastroenteritis (MC)
- Acute respiratory tract infections (Pneumonias)
- Leptospirosis
- Rickettsiosis
- Rabies
- Equine encephalitis

64. **Ans. (a) Methyl isocyanate** *[Ref. K Park 23/e p801]*

65. **Ans. (b) Leishmania** *[Ref. Park 23/e p797]*
- Diseases common in Post-disaster Phase: Gastroenteritis (MC), Acute respiratory tract infections (Pneumonias), Leptospirosis, Rickettsiosis, Rabies, Equine encephalitis

66. **Ans. (d) District** *[Ref. National Health Programmes in India by Dr Jugal Kishore, 9/e p457]*

67. **Ans. (a) Search and rescue, first aid** *[Ref. Park 23/e p796-797]*

68. **Ans. (c) Blue** *[Ref. Park 23/e p796]*

Review Question

69. **Ans. (c) Ambulatory patient** *[Ref. Park 23/e p796]*

OCCUPATIONAL HEALTH

70. **Ans. (d) Bagassosis** *[Ref. National Health programs of India by Dr. J Kishore, 5/e p430]*

Also Remember

- Under Factories Act 1948, there are 29 diseases which are notifiable (Schedule 3) including silicosis, Anthracosis, Byssinosis, Asbestosis.

71. **Ans. (d) Depends on type of exposure** *[Ref. Park 23/e p812-813]*
- The frequency and content of periodic medical examinations depend upon the type of occupational exposure
- *Periodic Medical Examination:* (for industrial workers) is held at appropriate intervals to test their physical and mental efficiency and to detect any departure from health at the earliest; objective being early diagnosis and prompt treatment (Secondary level of prevention). Frequency of periodic examinations:
  - Annual: for most of occupational exposures
  - Monthly: for lead, radium and dye-stuffs exposure
  - Daily: for dichromates exposure

72. **Ans. (c) 14** *[Ref. Park 23/e p812]*
- *According to the Factories Act, 1948:*
  - *Employment of young persons:*
    1. Employment prohibited for age less than 14 years
    2. 15 – 18 years old adolescents to be declared fit by 'certifying surgeons'; will work only between 6AM to 7PM
    3. Employment prohibited in certain dangerous occupations
  - *Hours of work:*
    1. A maximum of 4 $^{1/2}$ hours of work per day for adolescents
    2. 48 hours per week (9 hrs per day)
    3. Maximum 60 hours per week (including overtime).

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73. Ans. (b) 1000 *[Ref. Park 23/e p819]*

- *The Factories Act, 1948:*
  - Health, Safety and Welfare recommendations:
    1. A minimum of 500 cubic feet space per worker
    2. 1 Safety Officer per 1000 workers
    3. 1 Welfare Officer per 500 workers
    4. 1 Canteen for greater than 250 workers
    5. 1 Crèche for greater than 30 women workers

74. Ans. (a) Coproprophyrin in urine *[Ref. Park 23/e p807]*

- *Diagnosis of lead poisoning:*

Laboratory parameter	Remark
Coproporphyrin in Urine (CPU) >150 mcg/l	Exposure to lead
Amino levulinic acid in urine (ALAU) >5 mg/l	Indicates lead absorption
Lead in blood >70 mcg/100 ml	Clinical symptoms appear
Lead in urine >0.8 mg/l	Lead exposure and absorption
Basophilic stippling of RBCs	Punctate basophilia

Also Remember

- A useful screening test is Coproporphyrin in Urine (CPU)
- Lead Poisoning is known as 'Plumbism', Saturnism or Painter's Colic
- *Clinical picture of lead poisoning:*
  - Facial pallor: Earliest and most consistent sign
  - Anemia: Microcytic hypochromic
  - Punctate basophilia or basophilic stippling of RBCs
  - Burtonian Line: Lead sulphide line on gums (upper jaw)
  - Lead colic: Constipation (but sometimes diarrhea)
  - Lead Palsy (Peripheral neuropathy): Wrist drop or Foot drop
  - Lead encephalopathy
  - CNS effects: mostly due to organic lead compounds
- Clinical symptoms of plumbism occur when lead level in blood >70 mcg/100 ml
- A sensitive parameter of hematological response is Basophilic stippling of RBCs.

75. Ans. (a) Inhalation *[Ref. Park 23/e p807]*

- Greatest source of lead in Lead Poisoning (Plumbism, Saturnism or Painter's Colic) is Gasoline/petrol/vehicular exhaust/automobile exhaust
- Mode of absorption: Lead can be absorbed by inhalation (most common mode), ingestion or through skin

76. Ans. (a) Bagassosis *[Ref. Park 23/e p807]*

- Bagassosis occurs due to occupational exposure to fibrous residue of sugarcane (bagasse); Bagassosis has been shown to be due to Thermoactinomyces sacchari
- Bagasse contains a percentage of silica, innumerable fungal spores and micro-organisms; Bagasse dust blocks bronchioles thus leading to bronchitis and bronchopneumonia
- *Prevention and Bagasse control measures:*
  - Keeping moisture content > 20%
  - Spraying bagasse with 2% propionic acid (fungicide).

Also Remember

- Bagassosis is a form of extrinsic allergic alveolitis
- *Organisms involved in causation of bagassosis:*
  - Thermoactinomyces sacchari
  - Thermoactinomyces vulgaris
  - Micropolyspora faeni.

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77. Ans. (a) High sputum AFB +ve *[Ref. Park 23/e p807]*

- Patients with silicosis are particularly susceptible to tuberculosis (TB) infection, known as 'Silicotuberculosis' (ST)
  - The reason for the increased risk, 10–30 fold increased incidence, is not well understood
  - It is thought that silica damages pulmonary macrophages, inhibiting their ability to kill mycobacteria
- *In recent years doubts have risen in the association between silicois and tuberculosis as:*
  - Sputum is rarely AFB+
  - Children and women of STs do not develop tuberculosis
  - Post mortem of STs fail to prove existence of tuberculosis
  - Radilogical evidence of both conditions is similar.

Also Remember

- Among the occupational diseases, silicosis is the major cause of permanent disability and mortality
- Particles of the size 0.5 – 3 microns are most dangerous for causation of silicosis
- IP: Few months to 6 years
- X-ray shows 'snow storm appearance'
- No effective treatment is available
- Silicosis is a notifiable disease under Factories Act, 1948 and Mines Act 1952.

78. Ans. (b) Prickles *[Foundations of Community Medicine, 1/e p318]*

- *Disease manifestations associated with physical hazards:*
  - High Temperature
    1. Heat cramps
    2. Heat hyperpyrexia (body temperature <102°F)
    3. Heat exhaustion (body temperature >106°F)
    4. Heat stroke (body temperature up to 110°F)
  - Low Temperature
    1. Chilblains
    2. Trench Foot
    3. Frost bite
  - Low Pressure
    1. Caisson Disease
  - Vibration
    1. Vibration sickness
    2. Neurogenic damage
  - Non-ionizing Radiation
  - Microwave Injuries
  - Laser injuries
- Prickles: Irritation of nerve terminals in skin due to nitrogen bubbles as seen in Caisson Disease (low pressure).

Also Remember

- *Caisson Disease (Decompression Sickness, DCS):* Occurs due to low pressure, when a diver ascends rapidly to surface or air passengers ascend too rapidly to high altitudes
  - *Manifestations of air expansion:*
    1. Barodantalgia: Air trapped beneath teeth expands
    2. Barosinusitis: Compressed air trapped in sinuses expands
    3. Barotitis: Air under pressure trapped in middle ear expands
    4. Emphysema: Most serious complication (may lead to cerebral embolism)
    5. Abdominal distension: Air trapped in intestinal canal expands
  - *Effects of Nitrogen effervescence:*
    1. Bends: Steady aching pain in joints
    2. Chokes: Rapid, shallow, dyspneic breathing
    3. Prickles: Irritation of nerve terminals in skin
    4. Paralysis: Most serious complication
    5. Aseptic bone necrosis: Hip, knee and shoulder joints

Contd...

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Contd...

- Caisson Disease is a type of diving hazard and dysbarism.
- Recompression is the only effective treatment for severe DCS, although rest and oxygen applied to lighter cases can be effective.
- Gases implicated in DCS:
  - Nitrogen
  - Trimix (nitrogen + oxygen + helium)
  - Heliox (oxygen + helium).

79. Ans. (c) Secondary Prevention *[Ref. Park 23/e p813]*

- *Secondary Level of Prevention:* It halts the progress of disease at its' incipient stage and prevents complications (Modes of Intervention: Early Diagnosis and Treatment).

80. Ans. (d) A-III B-II C-IV D-I *[Ref. Park 23/e p807]*

81. Ans. (c) 500 cu ft *[Ref. K. Park 23/e p815]*

- *The Factories Act, 1948:*
  - Scope: The Act defines factory as an establishment employing 10 or more persons where power is used and 20 or more persons where power is not used.

82. Ans. (c) 5 rem per year *[Ref. Park 23/e p743-745, 809]*

RADIATION EXPOSURE:

- International Commission of Radiological Protection (ICRP) has set the maximum permissible level of whole body occupational exposure to ionizing radiation at '5 rem per year for workers' AND at '0.5 rem per year for general public'
- *ICRPs set of recommendations for radiation exposure:*
  - Any tissue or organ dose less than 50 rem per year
  - Lens of the eye dose less than 15 rem per year
  - Whole body dose less than 5 rem per year
  - Lifetime average dose less than 1 rem per year.

Also Remember

- Radiation poisoning, also called 'radiation sickness' or a 'creeping dose', is a form of damage to organ tissue due to excessive exposure to ionising radiation
- 1 Sv = 100 rem
  1 Gray = 100 rad
- For b–particles, X-rays and g-rays, rad and rem are equivalent
  For α–particles, 1 rad is equivalent to 20 rem
- Cow's milk contain a soluble radioactive substance: ^{90}Sr
- *Radiation exposure and effects:*

Dose (rem)	Effects	Signs and symptoms
5 – 20	No symptoms	—
20 – 50	No symptoms generally	Temporary ↓ in RBC count
50 – 100	Mild radiation sickness	Headache, ↑ infection risk, temporary male sterility
100 – 200	Light radiation poisoning	Vomiting, fatigue, ↓ immunity, spontaneous abortion, stillbirth
200 – 300	Moderate radiation poisoning	Loss of hair, massive leucopenia, permanent female sterility
300 – 400	Severe radiation poisoning	-do- Uncontrollable bleeding in mouth, under skin, kidneys
400 – 600	Acute radiation poisoning (severity)	-do-
600 – 1,000	Acute radiation poisoning	Complete bone marrow failure
1000 – 5000	Acute radiation poisoning	Massive diarrhea, bleeding, dyselectrolytemia, delirium, death
> 5000	Acute radiation poisoning	Death

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83. Ans. (d) Vibration *[Ref. Park 23/e p804]*

- After some months or years of exposure to vibrations (10 – 500 Hz), the fine blood vessels of fingers may become extremely sensitive to spasm, known as 'White fingers'.
- White fingers are a form of Raynaud's Disease. Vibration white finger is the vascular component of 'hand-arm vibration syndrome (HAVS)'.

84. Ans. (b) < 5 micron *[Ref. Park 23/e p806]*

- Pneumoconiosis occur due to occupational exposure to dust. Particles size 0.5 to 3.0 microns are the most dangerous (as a health hazard causing pneumoconiosis), as they reach the interior of lungs with ease.
- *Particle size and behavior:*

Particle size	Behavior
> 10 microns	Settle down by gravity
< 10 microns	Remain suspended in air
5 – 10 microns	Arrested in upper respiratory tract
3 – 5 microns	Deposited in mid respiratory tract
1 – 3 microns	Enter alveoli and settle there (cause pneumoconioses)
< 1 microns	Brownian movement

85. Ans. None of the choices *[Ref. Park 23/e p806]*

86. Ans. (d) Bagassosis *[Ref. Park 23/e p807]*

87. Ans. (c) Farmer's lung *[Ref. Park 23/e p807]*

- Farmer's Lung is due to inhalation of mouldy hay or grain dust. Micropolyspora faeni (Sacchorpolyspora rectivirgula) is the main cause of farmer's lung.

88. Ans. (a) Greatest source is drinking water from lead pipes *[Ref. Park 23/e p807]*

- *Source of lead:* Greatest source of environmental (non-occupational) lead is Gasoline/petrol/vehicular exhaust/automobile exhaust
- *Mode of absorption:* Lead can be absorbed by inhalation (most common), ingestion or through skin.

Also Remember

- A useful screening test is Coproporphyrin in Urine (CPU)
- A sensitive parameter of hematological response is Basophilic stippling of RBCs
- Plumbism (lead poisoning) can cause Burtonian's line (Blue Line on gums).

89. Ans. (a) Skin Cancer *[Ref. Park 23/e p808]*

- Nearly 75% of occupational cancers are skin cancers
- First attention was drawn by Percival Pott to cancer of scrotum in chimney sweepers
- Occupational skin cancers are predominantly 'squamous cell carcinomas'
- Only characteristic feature of occupational skin cancers their occurrence on exposed parts of the body (head, neck, hands, arms) that have remained in direct contact with a carcinogenic source
- Carcinogens implicated in occupational skin cancers include UV light, ionizing radiation, coal products, petroleum products, lubricating oils, fuel oils, etc.

90. Ans. (b) Naphthylamines *[Ref. Park 23/e p808]*

- Cancer bladder was first noted in man in Aniline industry in 1895
- *Now following has been mentioned as possible bladder carcinogens:*
  - β-napthylamines
  - Benzidine
  - Paraamino-diphenyl
  - Auramine
  - Magenta
- Industries associated with cancer bladder are dye-stuffs and dyeing industry, rubber, gas and electric cable industry

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Also Remember

- The most common symptom of cancer of the bladder is blood in the urine (haematuria)
  - Most common type of Ca-bladder (90%) is Transitional Cell (urothelial cell) carcinoma (TCC)
- Tobacco use (specifically cigarette smoking) is thought to cause 50% of bladder cancers discovered in male patients and 30% of those found in female patients
- Certain drugs such as cyclophosphamide and phenacetin are known to predispose to bladder TCC
- Immunotherapy in the form of 'Intravesical (pharmacotherapeutic) BCG instillation' is also used to treat and prevent the recurrence of superficial tumors.

91. Ans. (b) Occupational Health *[Ref. Park 23/e p812]*

- Pre-placement Examination: Is the foundation of an efficient occupational health service. It is done at the time of employment and includes worker's history (medical, family, occupational and social), physical examination and biological and radiological examinations.
- Main purpose of Pre-placement Examination is to place 'the right man in right job'; so that worker can perform his duties efficiently without detriment to his health (Ergonomics).
- Pre-placement Examination also serves as a useful benchmark for future comparison (examination and epidemiology).

Also Remember

- *Ergonomics (human factors):* Is the application of scientific information concerning objects, systems and environment for human use.

92. Ans. (c) 91 days *[Ref. Park 23/e p816-818]*

THE EMPLOYEES STATE INSURANCE (ESI) ACT, 1948: (NEW GUIDELINES)

- *Scope of ESI Act:* The act covers all the factories in India 'excluding mines, defence, railways'. The Act in the first instance applies to all non-seasonal factories, employing 10 or more persons, for wages on any day in implemented areas. (Now included education)
  - It covers all employees getting up to ₹ 15,000/- per month
- *Finance:* The employer contributes 4.75% of total wage bill; the employee contributes 1.75% of wages. State and Central Government share medical expenditure in ration of 1:7
- *Sickness Benefits to employees under ESI:*
  - *Sickness benefit:* 90% of the average daily wages and is payable for 91 days (in any continuous period of 365 days).
  - *Extended sickness benefit:* Payable for 2 years for a set of 34 diseases
  - *Enhanced sickness benefit:* Full average daily wage for duration upto 7 days in the case of Vasectomy and up to 14 days in the case of the Tubectomy.

Also Remember

- The per capita cost of medical benefit under ESI scheme was ₹ 905/- in 2001–02
- To become eligible to Sickness Benefit, one should have paid contribution for not less than 78 days during the corresponding contribution period
- Employees in receipt of a daily average wage up to ₹ 100/- are exempted from payment of contribution; Employers will however contribute their own share in respect of these employees
- Rajiv Gandhi Shramik Kalyan Yojana (under ESI): Unemployment allowance (at 50% wages for maximum 12 months) for employees who are rendered unemployed involuntarily due to closure of factory.

93. Ans. (d) State of health of the workers *[Ref. Park 23/e p810]*

SICKNESS ABSENTEEISM:

- Sickness absenteeism is a 'useful index in industry to assess the state of health of workers', and their physical, mental and social well-being
- *Rate of absenteeism reported in India:* 8 – 10 days per worker per year.

94. Ans. (c) Lead poisoning is not a notifiable disease *[Ref. Park 23/e p807]*

95. Ans. (a) Occurs within five years of exposure *[Ref. Park 23/e p807]*

- Asbestosis is a pneumoconiosis which occurs due to exposure to asbestos
- Asbestosis does not usually appear until after 5 – 10 years of exposure. Once established, the disease is progressive even after removal of worker from contact

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- Sputum shows 'asbestos bodies', which are asbestos fibres coated with fibrin
- Asbestos may lead to pulmonary fibrosis, carcinoma of bronchus, mesothelioma of peritoneum/ pleura and cancer of GIT
- Asbestos type most dangerous is 'amphibole'.

Also Remember

- *List of Pnemoconioses:*

Disease	Exposure source
Silicosis	Silica dust
Anthracosis	Coal dust
Asbestosis	Asbestos dust
Byssinosis	Cotton fibre
Bagassosis	Molasses (sugarcane)
Berylliosis	Beryllium
Farmer's Lung	Mouldy hay
Siderosis	Iron dust
Stannosis	Tin dust
Bird fancier's lung	Avian/ bird droppings
Compost lung	Compost

- *Antigens involved in Pneumoconioses:*

Disease	Antigen
Bagassosis	Thermoactinomyces sacchari
Farmer's Lung	Micropolyspora faeni
Compost lung	Aspergillus
Chemical workers lung	Isocyanates

- Pnemoconioses occur due to occupational exposure to dust, especially of the size 0.5 – 3.0 microns diameter Most Dangerous particle size)
- Coal workers lung is known as 'black lung'
- Silicosis is known as 'grinder's disease'.

96. Ans. (d) 2% propionic acid *[Ref. Park 23/e p807]*

97. Ans. (a) 48 *[Ref. Park 23/e p815]*

98. Ans. (d) All of the above *[Ref. Park 23/e p816]*

99. Ans. (d) Ether *[Ref. Davidson's, 20/e p1285, Park 23/e p809]*

100. Ans. (c) Inhalation *[Ref. Park 23/e p807]*

101. Ans. (a) Lead; (d) Agricultural insecticides
[Ref. Sittig's Handbook of Pesticides and Agricultural Chemicals by Stanley A. Greene, 1/e p319]

102. Ans. (c) Union Minister of Labour *[Ref. Park 23/e p816]*

103. Ans. (a) Applicable on educational institutions also; (c) Maternity benefit for 3 months *[Ref. Park 23/e p816]*

104. Ans. (b) A worker with income less than 70/- per day has to pay only 300/- per month; (c) Funeral expenses is 50,000/- *[Ref. Park 23/e p816-818]*

- Under ESI, a worker with income below 100/- per day is exempted from payment of contribution
- Under ESI, Funeral expenses are Rs 10000/-

105. Ans. (b) 1000 *[Ref. Park 23/e p823]*

ESI NORMS:

- Setting up of one Doctor Dispensary: ≥ 1000 Family units
- Setting up of Two Doctor Dispensary: ≥ 2000 Family units
- Setting up of Diagnostic centers: ≥ 5000 Family units
- Setting up of 100 Bedded Hospital: ≥ 15000 Family units

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106. **Ans. (b) Leukaemia** *[Ref. Park 23/e p808]*
    - *Occupational exposures leading to Leukemia*:
        - Benzol
        - X-rays
        - Radioactive substances

107. **Ans. (d) Nutritional allowance** *[Ref. Park 23/e p816-818]*

Review Questions

108. **Ans. NONE (now up to 2 years)** *[Ref. Park 23/e p817]*
109. **Ans. (b) Textile industries** *[Ref. Park 23/e p806]*
110. **Ans. (b) Surgarcane fibres** *[Ref. Park 23/e p807]*
111. **Ans. (d) Silica fibres** *[Ref. Park 21/e p747-748, Park 22/e p751-52]*
112. **Ans. (b) Heat cramps** *[Ref. Internet]*
113. **Ans. (b) 4.75%** *[Ref. Park 23/e p816]*
114. **Ans. (d) Leukemia** *[Ref. Harrison 16/e p442, Park 23/e p808]*
115. **Ans. (a) Battery industry** *[Ref. Park 23/e p808]*
116. **Ans. (b) Silicosis** *[Ref. Park 23/e p806]*
117. **Ans. (a) Byssinosis** *[Ref. Park 23/e p806]*
118. **Ans. (d) Defence establishment** *[Ref. Park 23/e p816-818]*
119. **Ans. (b) Non power using factories with 18 members** *[Ref. Park 23/e p816-818]*
120. **Ans. (b) Byssinosis** *[Ref. Davidson 19/e p557, CMDT 2014 p301, Harrison 16/e p1525]*
121. **Ans. (d) Upper lobes of lungs** *[Ref. Park 23/e p806]*
122. **Ans. (a) 0.1-5 m** *[Ref. Park 23/e p806]*
123. **Ans. (b) Chemical hazards** *[Ref. Park 23/e p805-806]*
124. **Ans. (b) 500sq feet minimum space required per person** *[Ref. Park 23/e p812]*
125. **Ans. (b) Silicosis** *[Ref. Park 23/e p806]*
126. **Ans. (a) 14** *[Ref. Park 23/e p812]*
127. **Ans. (a) Brucellosis** *[Ref. Park 23/e p806-807]*
128. **Ans. (d) 500** *[Ref. Park 23/e p812]*
129. **Ans. (d) Exemption from sales tax** *[Ref. Park 23/e p816]*
130. **Ans. (b) < 48 hours** *[Ref. Park 23/e p815]*
131. **Ans. (b) 0.5-3** *[Ref. Park 23/e p806]*
132. **Ans. (a) 1/8** *[Ref. Park 23/e p816]*
133. **Ans. (d) > 10 years** *[Ref. Park 23/e p806]*
134. **Ans. (d) Psittacosis** *[Ref. Park 23/e p806]*
135. **Ans. (b) Lead** *[Ref. Reproductive Endocrinology and Infertility by Carrell & Peterson, /e p800]*
136. **Ans. (d) 70 mcg/100 ml blood** *[Ref. K Park 22/e p753]*
137. **Ans. (b) 4.75%** *[Ref. K Park 23/e p816]*
138. **Ans. (a) Bagassosis** *[Ref. K Park 23/e p807]*
139. **Ans. (a) Adjusting the Worker to his job** *[Ref. K Park 23/e p801]*
140. **Ans. (d) 2 years** *[Ref. K Park 23/e p817]*
141. **Ans. (a) Lead** *[Ref. K Park 23/e p807]*

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142. Ans. (d) Breast ca *[Ref. K Park 23/e p808]*

143. Ans. (b) State government share is 1/8 and ESI Corporation is 7/8 *[Ref. K Park 23/e p816]*
Finance under ESI:
- Employer contributes 4.75% of total wage bill
- Employee contributes 1.75% of wages
- State and Central Government share medical expenditure in ration of 1:7

144. Ans. (b) Anthrax *[Ref. Workman's Compensation Act, 1923 document]*

145. Ans. (c) Micropolyspora faeni *[Ref. K Park 23/e p807]*

146. Ans. (b) Medical benefit *[Ref. K Park 23/e p816-817]*

147. Ans. (b) 100% wages in temporary disability; (c) Extended sickness benefit 91 days *[Ref. K Park 23/e p816-818]*

GENETICS

148. Ans. (c) Population genetics *[Ref. Park 23/e p827]*
- *Hardy Weinberg Law*: States that the genotype frequencies in a population remain constant or are in equilibrium from generation to generation unless specific disturbing influences are introduced.
- Genetic equilibrium (HW law) is a basic principle of population genetics; the entire principle is based on Mendelian genetics.
- *Deviations in HW law:* HW law fails to apply in:
  - non-random mating (assortative mating)
  - new mutations
  - genetic drift
  - gene flow
  - natural selection (mortality selection, fecundity selection)
  - small populations
  - migrations
  - dynamic populations
- HW law assumes that human population is static, large and has random mating.

149. Ans. (c) Identify genes and sequence of base pairs in DNA of human genome *[Ref. Park 23/e p826]*

HUMAN GENOME PROJECT (HGP)
- *Human Genome Project:* HGP is an international scientific research project
- Primary goals were to determine the sequence of chemical base pairs which make up DNA and to identify the approximately 25,000 genes of the human genome
  - They also want to understand it and complete a map of all their findings
- The project began in 1990 initially headed by James D. Watson
- Ongoing sequencing led to the announcement of the essentially complete genome in April 2003
- The goals of the original HGP were not only to determine more than 3 billion base pairs in the human genome, but also to identify all the genes in this vast amount of data
  - This part of the project is still ongoing, although a preliminary count indicates about 22,000–23,000 genes in the human genome.

Also Remember
- *Genome:* The sum total of genetic information of an individual which is encoded in structure of DNA
- *Genomics:* Is the study of genome
- *Gene Therapy:* Introduction of a gene sequence into a cell to modify its behavior
- Development of new diagnostic techniques such as restriction enzymes is a component of DNA Technology

150. Ans. (a) 14th week of gestation *[Ref. Park 23/e p829]*
- *Amniocentesis:* Examination of a sample of amniotic fluid makes possible the prenatal diagnosis of chromosomal anomalies and certain metabolic defects; The procedure can be used as early as 14th week of pregnancy when abortion of affected fetus is still feasible
  - Culture and karyotyping of fetal cells from amniotic fluid is used for diagnosis of fetal anomalies
  - Biochemical analysis of amniotic fluid is used for diagnosis of metabolic effects

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- *Amniocentesis is indicated in following circumstances:*
  - A mother aged > 35 years (high risk of Down's Syndrome)
  - Patients who have had a child with Down's Syndrome or other chromosomal anomalies
  - Parents known to have chromosomal translocation
  - Patients who have had a child with metabolic defect
  - When sex-determination is warranted

Also Remember

- Various genetic testing may be performed, but the three most common abnormalities tested for are
  - Down's syndrome
  - Trisomy 18
  - Spina bifida

151. Ans. (c) X-linked recessive *[Ref. Park 23/e p823-824]*

- *Mendelian diseases and their inheritance:*

Autosomal dominant traits	Autosomal recessive traits
Achondroplasia	*Albinism*
Huntington's chorea	*Phenylketonuria*
Neurofibromatosis	*Tay sachs disease*
Familial polyposis coli	*Alcaptonuria*
Marfan's Syndrome	*Cystic fibrosis*
Retinoblastoma	*Galactosemia*
ABO blood group system	*Hemoglobinopathies*
Hyperlipoproteinemia I, II, III, IV	*Maple syrup urine disease*
Polycystic kidney	*Megacolon (Hirschsprung Dis)*
Hereditary spherocytosis	

Sex-linked dominant traits	Sex-linked recessive traits
Vitamin-D resistant rickets	*Hemophilia type A and B*
Blood group Xg	*Duchenne muscular dystrophy*
Familial hypophosphatemia	*Color blindness*
	G6PD deficiency
	Hydrocephalus
	Retinitis pigmentosa

152. Ans. (c) Euthenics *[Ref. Park 23/e p828]*

- *Eugenics (Sir Francis Galton):* Is a social philosophy which advocates the improvement of human hereditary traits through various forms of intervention (Genetic Manipulation).
- *Euthenics:* Deals with human improvement through altering external factors such as education and the controllable environment, including the prevention and removal of contagious disease and parasites, environmentalism, education regarding home economics, sanitation, and housing (Environmental Manipulation).

Also Remember

- Earlier proposed means of achieving eugenic goals focused on selective breeding, while modern ones focus on prenatal testing and screening, genetic counseling, birth control, in vitro fertilization, and genetic engineering
- Euthenics is a pre-requisite for Eugenics
- *Dysgenics:* Is a term describing the progressive evolutionary 'weakening' or genetic deterioration of a population of organisms relative to their environment.

153. Ans. (c) 0.7 mg/litre *[Ref. Internet]*

- Level of residual chlorine to be maintained in all water bodies in post-disaster phase is > 0.7 mg/l (> 0.7 ppm).

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Also Remember

- Level of residual chlorine to be maintained in drinking water is > 0.5 mg/l (> 0.5 ppm) for a contact period of 1 hour
- Level of residual chlorine to be maintained for swimming pool sanitation is > 1.0 mg/l (> 1.0 ppm).

154. Ans. (a) Hypertension; (c) Manic depressive psychosis *[Ref. Park 21/e p762, Park 22/e p766]*

155. Ans. None *[Ref. K. Park 23/e p827]*

156. Ans. (d) Ataxia telengiectasia *[Ref. K. Park 23/e p823]*

157. Ans. (b) Prospective genetic counselling *[Ref. Park 23/e p828]*

GENETIC COUNSELLING:

- *Prospective genetic counselling*: Identify heterozygous individuals for any particular defect (though screening) and explaining to them risk if having affected children, if they marry another heterozygote for same gene
  - *Useful in*: Thalassemia, Sickle cell anemia
- *Retrospective genetic counselling*: Seeking genetic advice after hereditary disorder has already occurred in the family
  - *Useful in*: Congenital anomalies, Mental retardation, Psychiatric illness, Inborn errors of metabolism

Review Questions

158. Ans. (a) The study *[Ref. Park 23/e p827]*

159. Ans. (d) Affect more people in later age group than children *[Ref. Park 23/e p822-823]*

160. Ans. (c) Hardy Weinberg law *[Ref. Park 23/e p827]*

161. Ans. (c) Genetics *[Ref. Park PSM 19/e p680]*

162. Ans. (b) Random mating *[Ref. K Park 23/e p827]*

163. Ans. (a) Wilson's disease; (c) Thalassemia; (e) ABO blood groups system *[Ref. K Park 23/e p823]*

164. Ans. (c) Euthenics *[Ref. K Park 23/e p828]*

MENTAL HEALTH

165. Ans. (b) Tobacco *[Ref. Park 23/e p834-835]*

- In India, about 47% of males and about 17% of females smoke.

Also Remember

- *Cannabis:*
  - Is the '*most widely used drug today*' (Most commonly abused Narcotic substance)
  - *Most common reaction:* Dreamy state of altered consciousness
  - *Forms of Cannabis:*
    1. *Bhang:* Dried leaves and flowering shoots
    2. *Hashish/Charas:* Resinous exudates from flowering tops of the female plant
    3. *Ganja:* Resinous mass from small leaves and brackets of inflorescence
    4. *Marijuana:* Refer to any part of plant that induces somatic and psychic changes in man
- *Heroin:*
  - *'Heroin addiction is worst type of addiction'*
  - Heroin is Di-acetyl-morphine
- *Amphetamine:*
  - Synthetic drug structurally similar to adrenaline
  - *Known as 'Superman drugs':* Tremendous boost to energy and self-confidence.

166. Ans. (c) Endocrine diseases *[Ref. Park 23/e p832]*

- *Causes of mental health disorders:*
  - *Organic conditions:* Cerebral arteriosclerosis, neoplasma, metabolic diseases, endocrine diseases and chronic diseases (TB, leprosy, epilepsy)
  - *Heredity:* Schizophrenia

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- *Socio-pathological:* Worries, anxiety, emotional stress, tension, frustration, unhappy married life, broken homes, poverty, industrialization, urbanization, cruelty, rejection, neglct, etc.

Also Remember

- WHO analysis shows a global point prevalence of neuro-psychiatric conditions is about 10% for adult
  - *MCC of DALYs lost:* Unipolar depressive disorders
  - *MCC of deaths:* Alzheimer's and other dementias
- *Mental morbidity in India:* 18 – 20 per 1000
- *DSM-IV Criteria:* Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision, DSM-IV-TR, is a manual published by the American Psychiatric Association (APA) that includes all currently recognized mental health disorders. The coding system utilized by the DSM-IV is designed to correspond with codes from the International Classification of Diseases, ICD.

167. Ans. (b) Depression *[Ref. Park 23/e p832]*

- *DALYs lost due to mental disorders:*

Type of disorder	DALYs lost
Unipolar depressive disorders	64963
Alcohol disorders	18469
Schizophrenia	15686
Bipolar affective disorders	13645
Alzeihmer's dementia	12464
Migraine	7539
Epilepsy	7067

MISCELLANEOUS

168. Ans. (a) 3 weeks (Now 2 weeks) *[Ref. RNTPC Key Facts and Concepts by DGHS, Park 21/e p392, Park 22/e p396]*

169. Ans. (c) Finding genotype of offspring *[Ref. Internet, Wikipedia]*

PUNNETT SQUARE

- Is a diagram that is used to predict the result of a cross/breeding experiment
- Is representing summary of every possible combination of each maternal allele with paternal allele for each gene studied in square
- Is used by biologists 'to determine the probability of an offspring having a particular genotype'
- Can be used for both monohybrid and dihybrid cross
- Are standard tools for genetic counsellors
- *Typical example of a Punnett square:*

	Y	y
Y	YY	Yy
y	Yy	yy

170. Ans. (d) Recycling *[Ref. Electronic Waste Management by RE Hester, Volume 27, p111]*

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CHAPTER 13

Health Education and Communication

HEALTH COMMUNICATION

Communication Process

- *Communication process:* Process of exchanging ideas, feelings and information
- *Components of communication process*[Q]*:*
  - Sender (source)
  - Message (content)
  - Feedback (effect)
  - Receiver (audience)
  - Channel(s) (medium)

TYPES OF COMMUNICATION

1. *One-way Communication Vs Two-way Communication:*
   - *One-way communication (Didactic Method*[Q]*):* Flow of communication is one way – from communicator to audience
     - *Disadvantages of one way communication*[Q]*:*
       a. Knowledge is imposed and learning authoritative
       b. Little audience participation and no feedback
       c. Does not influence human behaviour
       d. Makes no attempt at removing misconceptions and misunderstandings
       e. Communicates message even if unintelligible or unacceptable
       f. Autocratic process
     - *Examples of one way communication*[Q]*:*
       a. Lecture method (Chalk and talk method)
       b. Television
       c. Radio
       d. Newsprint
   - *Two-way communication (Socratic Method*[Q]*):* Two way communication in which both the communicator and the audience take part
     - *Advantages of two way communication*[Q]*:*
       a. Active participatory and democratic process
       b. More likely to influence human behaviour
       c. Better audience participation and feedback
     - *Examples of two way communication*[Q]*:*
       a. Focus Group Discussion (FGD)
       b. Symposium
       c. Panel discussion
2. *Verbal Communication Vs Non-verbal Communication:*
   - *Verbal Communication:* Face-to-Face communication
     - Advantages of verbal communication:
       a. May be loaded with hidden meanings
       b. Persuasive
   - *Non-verbal Communication:* Indirect interaction
     - Advantages of non-verbal communication:
       a. Silence speaks louder than words
3. *Other Types of Communication:*
   - *Formal Communication:* Follows line of authority
   - *Non-formal Communication:* Grape-vine communications
     - Advantages: May be more active than formal channels
   - *Visual Communication:* Comprises charts, graphs, pictograms, tables, maps, posters.

I One-way communication (Didactic Method)

I Two-way communication (Socratic Method)

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COMMUNICATION METHODS

Audio-Visual Aids

- *Audiovisual aids:* No health education can be effective without audiovisual aids
- *Auditory aids:* Radio, cassette tape-recorder, microphone, amplifier, earphone, public address system, disks
- *Visual aids:*
  - *Not requiring projection:* Chalk-board, leaflets, posters, charts, flannelgraph, exhibits, models, specimens, diagrams, photographs
  - *Requiring projection:* Slides, filmstrips, overhead projector, epidiascope
- *Combined A-V aids*[Q]*:* Television, sound films (cinem(a), synchronized slide-tape combination, multimedia, videotape system, drama, skits

Delphi Method

- *Delphi method*[Q]*:* Is a 'systematic interactive forecasting method' for obtaining consensus forecasts from a panel of independent geographically dispersed experts
- *Method:*
  - Carefully selected experts answer questionnaires in two or more rounds
  - After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments
  - Thus, participants are encouraged to revise their earlier answers in light of the replies of other members of the group
  - Range of the answers decrease and the group will converge towards the 'correct' consensual answer
  - Finally, the process is stopped after a pre-defined stop criterion (e.g. number of rounds, achievement of consensus, stability of results) and the mean or median scores of the final rounds determine the results
- *The objective of most Delphi applications:* Reliable and creative exploration of ideas or the production of suitable information for decision making

Counselling

- *Definition:* Counselling is face-to-face communication through which a person is helped to make a decision or solve a problem[Q]
- Counselling helps clients make informed choices
- *COUNSELLING IS DIFFERENT FROM ADVICE:* In Counselling, 'Choice is given to clients'[Q]
- *Elements of Counselling:* (**GATHER** Approach[Q])
  - *G:* Greet the clients (make them comfortable, give attention)
  - *A:* Ask/ascertain needs/problems or reasons for coming
  - *T:* Telling different methods/options/choices to solve the problem
  - *H:* Help client to make voluntary decisions
  - *E:* Explain fully the chosen decision/action/method
  - *R:* Return for follow-up visit
- GATHER Approach can be used for counselling about contraceptives

I Counselling helps clients make informed choices

I Elements of Counselling:
G: Greet
A: Ask
T: Tell
H: Help
E: Explain
R: Return visit

Group Approach to Health Education

1. *Chalk and Talk (Lecture):*
   - *For effective communication through lecture method*[Q]*:*
     - Group size should be <30
     - Talk duration <15–20 minutes
     - Combine with flip charts, flannelgraphs, exhibits, films and charts
   - *Advantages of lecture method*[Q]*:*
     - Most economical method
     - Information transfer in a short time to a large group
     - Less preparation and minimal resources

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- *Disadvantages of lecture method:*
  - Learning is passive; does not motivate
  - Suitable only for small groups
  - Students are involved to minimal extent
  - Do not stimulate thinking or problem solving capacity
  - Comprehension and retention varies with student
  - Health behaviour of listeners not necessarily affected

2. *Demonstrations:*
   - *Definition:* Is a carefully planned presentation to show how to perform a skill or procedure
   - *Method:* Demonstrator carries out step-by-step in font of an audience and involves them
   - *Advantages:*
     - Dramatises by arousing interest
     - Persuades onlookers to adopt
     - Upholds principles of 'seeing is believing' and 'learning by doing'[Q]
     - Can bring desirable changes in behaviour
     - High motivational value
   - *Utility:*
     - Environmental sanitation (hand pump installation, use of sanitary latrine)
     - MCH (ORS technique[Q])
     - Control of disease (Scabies)

I Demonstrations:
– Upholds principles of 'seeing is believing' and 'learning by doing'

3. *Group Discussion*
   - *Description:* A group is an aggregation of people interacting in a face-to-face situation[Q]
   - *Advantages of group discussion:*
     - A very effective method of health communication
     - Well conducted group discussion is 'effective to change health behaviour and attitudes'[Q]
     - Permits learning by free exchange of ideas, knowledge and opinions
     - Provides a wider interaction among members
     - Valuable to ensure long term compliance
   - *Ensuring an effective discussion:*
     - Group size of '6 – 12 members', including[Q]
     - *1 group leader:* Initiates discussion, helps discussion in a proper manner, prevents side conversations, encourages everyone to participate and sums up the discussion
     - *1 recorder:* Record, report on issues discussed and agreements reached
     - *Rules to be followed*[Q]*:*
     - Listen to what others are saying
     - Express ideas clearly and concisely
     - Do not interrupt when others are saying
     - Make only relevant remarks
     - Accept criticism gracefully
     - Help to reach conclusions
   - *Limitations of group discussion:*
     - *Unequal participation:* Those shy may not take part in discussion while some may dominate the discussion
     - Some may deviate from the subject and make the GD irrelevant or unprofitable

I Well conducted group discussion is 'effective to change health behaviour and attitudes'

4. *Panel Discussion:*
   - *Features of a panel discussion:*
     - '4 – 8 persons' who are qualified to talk about the topic sit and discuss a given problem/topic in front of a target group or audience[Q]
     - Panel comprises,
     - A chairman or moderator
     - 4-8 expert speakers

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- *Method of Panel discussion:*
  - The chairman introduces topic briefly and invites panel members to speak
  - There is 'no specific agenda, no order of speaking and no set speeches'Q
  - The success of panel depends on chairman; he makes it going and provides train of thought
  - After speakers explore the topic, audience is invited to take part
  - Panelists may have to have a preliminary meeting and prepare the material on the subject
- *Advantages of a panel discussion*Q*:*
  - Flexible, spontaneous; better understanding of various aspects, keeps audience alert
  - If properly planned and guided, panel discussion can be 'an extremely effective method of education'
- *Disadvantages of a panel discussion*Q*:*
  - Needs a thorough planning and preparation in advance
  - Panelists need to be of sufficient experience
  - Audience is usually passive

I Panel discussion 'no specific agenda, no order of speaking and no set speeches'

5. *Symposium:*
   - *Features of a symposium:*
     - A series of speeches/ lectures on a selected subjectQ
     - Each person or expert presents an aspect briefly
     - There is no discussion among symposium membersQ
     - Audience may raise questions in the end
     - Chairman makes a comprehensive summary at the end of symposium
     - In an ideal symposium, there is no discussion in between presentations of speakers
   - *Advantages of a symposium:* Q
     - Transfers concise information to audience at one time
     - Audience remains alert (frequent change of speakers)
     - Analysis of different aspects of a topic at one time
     - Good tool for integrated teaching
   - *Disadvantage of a symposium:*
     - No discussion during symposium (Q and A at end)

I *Symposium*: series of speeches/lectures on a selected subject

6. *Workshop:*
   - *Features of workshop:*
     - A series of meetings usually >4Q
     - Emphasis is on individual work within the group to impart trainingQ
     - Help sought from consultants and resource personnel
     - Total workshop may be divided in to smaller groups; each group will choose a chairman and a recorder
     - Individuals solve a problem through personal effort with help of consultants, contribute to group work and group discussion and leave workshop with concrete suggestions and a 'plan of action' on problemQ
   - *Advantages of workshop:*
     - Learning takes place in a friendly, happy and democratic atmosphere, under expert guidance
     - Provides each participant an opportunity to improve his effectiveness a s a professional worker
   - *Disadvantages of workshop:*
     - Needs a lot of baseline ground workQ
     - Benefits a small no. of people

I *Workshop:* A series of meetings usually >4 to impart training

7. *Role-Playing (Socio-Drama):*
   - *Features of role-playing*:
     - Situation is dramatized by a group
     - Group enact as if they have observed/experienced it
     - Audience not passive; actively concerned with drama; can suggest alternative solutions at request of leader

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- Followed by discussion of the problem
- *Ideal size of the group:* 25[Q]

- *Advantages of role-playing:*
  - Useful to discuss problems of human relationships[Q]
  - Useful educational device for school children[Q]

8. *Conferences and Seminars:*
   - *Features of conferences and seminars:*
     - Contains a large component of commercialized continuing education
     - Usually held on a regional, state or national level[Q]
     - ½ day to 1 week in length
     - May cover a single topic in depth or be broadly comprehensive
     - Use variety of teaching formats: self instruction to mass media

HEALTH EDUCATION

Health Education

- *Health Education:* The process by which individuals and groups of people learn to behave in a manner conducive to the promotion, maintenance or restoration of health (John M. Last)[Q]
- *Changing concepts of Health Education (Alma – Ata Declaration, 1978):*

Older emphasis	New emphasis[Q]
Prevention of disease	Promotion of healthy lifestyles
Modification of individual behaviour	Modification of social environment
Community participation	Community involvement
	Promotion of individual & community self reliance

Approaches to Health Education[Q]

- *Regulatory approach (Managed prevention):*
  - Defined as any Governmental intervention
  - Coercive approach or Legislative approach
  - Useful in times of emergency
- *Service approach:*
  - Providing health services at peoples' door step
  - Not based o felt needs
- *Health education approach:*
  - Slow but enduring results
- *Primary health care approach:*
  - Radically new approach[Q]
  - Community involvement and intersectoral coordination
  - Help individuals becomes self reliant in health

I Primary health care approach: Radically new approach

Principles of Health Education[Q]

- Credibility
- Interest
- Participation
- Motivation
- Comprehension
- Reinforcement
- Learning by doing
- Known to unknown
- Setting an example
- Good human relations
- Feedback
- Leaders

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Health Education versus Propaganda/ Publicity

	Health education	Health propaganda
Knowledge and skills[Q]	Actively acquired	Instilled in minds
Promotion of thought process[Q]	Present	Absent
Primitive desires	Disciplines	Arouses
Behaviour developed[Q]	Reflective behaviour	Reflexive behaviour
Appeals to[Q]	Reason	Emotion
Develops	Individuality, personality	Set attitudes, behaviour
Knowledge acquired by	Self-reliant activity	Passive spoon-feeding
Process[Q]	Behaviour centred	Information centred

MISCELLANEOUS

Mass Media

- *Mass media:* TV, radio, printed media
  - Mass media are mainly a one-way communication (Didactic Methods)
- *Advantages of mass media[Q]:*
  - Reaches a relatively larger population in a shorter time than with other means
  - Useful for message transmission even in remote areas
  - More influential with average and below average education level
  - Get public attention
- *Disadvantages of mass media[Q]:*
  - Being impersonal, not usually effective in changing established modes of behaviour if used alone
  - *One way communication:* Carry messages from centre to periphery; feedback mechanisms are poorly organized

I Advantages of mass media: Reaches a relatively larger population in a shorter time

Methods of Mass Media

- *Television:*
  - Most popular of all media[Q]
  - Creates awareness, influence public opinions and introduce new ways of life
  - Raise levels of understanding
  - Has much potential for health communication
  - Not much opportunity for feedback and discussion
- *Radio:*
  - Purely didactic medium
  - Valuable aid in putting across health information
- *Internet*:
  - Fast growing communication media[Q]
  - Holds very large potential to become a major health education tool
- *Newspapers:*
  - Most widely disseminated of all forms of literature[Q]
  - Reach only to limited population (literates)
- *Printed material:*
  - Can convey detailed information
  - Produced in bulk at low cost, can be shared
- *Direct mailing:*
  - New innovation in health communication
- *Posters, billboards, signs:*
  - Can be displayed at public places
  - Less effective in changing behaviour
- Health museums and exhibitions
- Folk media

I *Television:* Most popular of all media

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MULTIPLE CHOICE QUESTIONS

HEALTH COMMUNICATION

1. **Which of the following is the correct sequence of various components of the 'communication process':** *[AIIMS Nov 1993]*
   (a) Receiver, Message, Channel, Feedback, Sender
   (b) Sender, Feedback, Message, Channel, Receiver
   (c) Sender, Message, Channel, Receiver, Feedback
   (d) Message, Sender, Channel, Feedback, Receiver

TYPES OF COMMUNICATION

2. **Lecture Method of teaching is a type of:**
   (a) Socratic Method *[AIIMS June 92]*
   (b) Didactic Method
   (c) Non-verbal communication
   (d) Visual Communication

3. **All of the following involve a two-way communication *except*:** *[AIIMS Dec 1991]* *[Karnataka 2008]*
   (a) Symposium
   (b) Lecture
   (c) Panel discussion
   (d) Workshop

4. **Socratic method of education consists of all *except*:**
   (a) Lecture *[DNB December 2010]*
   (b) Group discussion
   (c) Seminar
   (d) Panel discussion

5. **Which of the following is/are didactic methods of health communication?** *[PGI November 2013]*
   (a) Group discussion
   (b) Workshop
   (c) Demonstration
   (d) Lecture
   (e) Panel discussion

6. **Which of the following is the socratic method of teaching?** *[DNB 2008]*
   (a) Lecture
   (b) Films
   (c) Exhibition
   (d) Panel discussion

7. **In one of the method of health communication, 4 to 8 persons who are qualified to talk about the topic sit and discuss a given problem/topic in front of a large group or audience, this method is called as** *[PGMCET 2015]*
   (a) Symposium *[DNB December 2011]*
   (b) Panel discussion
   (c) Workshop
   (d) Seminar

Review Questions

8. **An example of a two-way discussion is?** *[DNB 2003]*
   (a) A seminar
   (b) Role playing
   (c) Symposium
   (d) Group Discussion

9. **Which of the following is the Socratic method of teaching:** *[DNB 2008]*
   (a) Lecture
   (b) Films
   (c) Exhibition
   (d) Panel discussion

10. **True about mass media education *except*:** *[RJ 2001]*
    (a) Rapid
    (b) High rich content
    (c) Distorted information
    (d) Local community needs

11. **Which is incorrect about socratic method?** *[RJ 2008]*
    (a) Two way communication
    (b) Audience can raise question
    (c) Active and democratic
    (d) Audience can take part

COMMUNICATION METHODS

12. **A tool for increasing consensus among a large no. of people is:** *[AIPGME 2006]*
    (a) Chalk and talk (lecture)
    (b) Delphi method
    (c) Television
    (d) Interpersonal communication (IPC)

13. **GATHER Approach is useful for:** *[AIPGME 01]*
    (a) Chlorination of water
    (b) Counselling
    (c) Refuse disposal
    (d) Data analysis

14. **A series of speeches is given by experts but there is no discussion among speakers. This is seen in:**
    (a) Symposium *[AIIMS Dec 1995]*
    (b) Lecture
    (c) Panel discussion
    (d) Workshop

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15. **The most effective method for motivating a couple for adopting family planning practices is:** *[AIIMS Nov 01]*
    (a) Printed material
    (b) Films and television
    (c) Group discussion
    (d) Interpersonal communication

16. **All are a type of audio-visual aids *except*:**
    (a) Television *[AIIMS June 1992]*
    (b) Cinema
    (c) Flannelgraph
    (d) Slide-tape combination

17. **All are true for a group discussion *except*:**
    (a) Not a very effective method of health communication *[AIPGME 1991]*
    (b) Ideally a group should comprise of 6-12 members
    (c) Can lead to change in health attitudes and behaviour
    (d) Allows free exchange of ideas and opinions

18. **Best method of teaching an urban slum about ORS is:**
    (a) Lecture *[DPG 2005]*
    (b) Role play *[Recent Question 2013]*
    (c) Demonstration
    (d) Flash cards

19. **All of the following facts are true with group discussion *except*:** *[Karnataka 2006]*
    (a) Group discussion is very effective method of health education
    (b) Group members should not have known each other before
    (c) The group should sit in a circle
    (d) There should be a group leader to initiate

20. **Panel discussion can be defined as:** *[Karnataka 2007]*
    (a) Series of speeches
    (b) Discussion by 4-8 qualified persons
    (c) Groups describing individual experiences
    (d) Stage wise formatted teaching

21. **All are true about Panel discussion *except*:** *[Recent Question 2012]*
    (a) Panel of 4-8 experts discuss a health topic
    (b) Audience is present
    (c) Specific order, Set speeches
    (d) Audience can take part

22. **Following are the Group health education approaches *except*:** *[UPSC CMS 2015]*
    (a) Lecture
    (b) Demonstration
    (c) Role play
    (d) Documentary

Review Questions

23. **Which method is used for HIV pretest counselling:**
    (a) Individual approach *[DNB 2002]*
    (b) Group approach
    (c) Mass media
    (d) All of the above

24. **Which method is used for HIV postest counselling:**
    (a) Individual approach *[DNB 2005]*
    (b) Group approach
    (c) Mass media
    (d) All of the above

HEALTH EDUCATION

25. **Principles of Health Education include all *except*:**
    (a) Participation *[AIPGME 1996]*
    (b) Motivation
    (c) Reinforcement
    (d) Punishment

26. **All of the following are approaches to health education *except*:** *[AIIMS May 09]*
    (a) Service approach
    (b) Regulatory approach
    (c) Health education approach
    (d) Mass media

27. **All of the following can be done with Individual as a unit *except*:** *[AIPGME 2012]*
    (a) Drug administration
    (b) Vaccination
    (c) Health education
    (d) Case report

28. **Which of the following statements refers to propaganda?** *[Karnataka 2011]*
    (a) Appeals to emotion
    (b) Develops individuality
    (c) The process is behaviour centered
    (d) Makes people think for themselves

29. **In which model of health education does 'internalization' occurs:** *[AP 2014]*
    (a) Medical model
    (b) Socio-environmental model
    (c) Service model
    (d) Motivation model

Review Question

30. **Health education charts serially flashed to the group as the talk is being given is called as:** *[MP 2007]*
    (a) Flannel graph
    (b) Flip charts
    (c) Flash cards
    (d) Exhibition charts

MISCELLANEOUS

31. **All are advantages of using mass media *except*:**
    (a) More influential with average and below average education level *[AIPGME 1996]*
    (b) Gives greater support for concentrated programmes
    (c) Get public attention
    (d) Reaches the widest population

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32. Most popular media for mass education of general public is: *[AIPGME 1998]*
(a) Television
(b) Radio
(c) Newspaper
(d) Internet

33. Most persuasive and effective media system for communication is: *[AIIMS Dec 1995]*
(a) Interpersonal Communication
(b) Mass Media (TV, Radio)
(c) Folk Media
(d) Printed Media

Review Question

34. Counselor must have all *except*: *[Kolkata 2007, 2008]*
(a) Sensitivity
(b) Sympathy
(c) Understanding
(d) Patience

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EXPLANATIONS

HEALTH COMMUNICATION

1. **Ans. (c) Sender, Message, Channel, Receiver, Feedback** *[Ref. Park 23/e p854]*
   - *Communication process*: Process of exchanging ideas, feelings and information
   - *Components of communication process*:
     - Sender (source)
     - Receiver (audience)
     - Message (content)
     - Channel(s) (medium)
     - Feedback (effect)

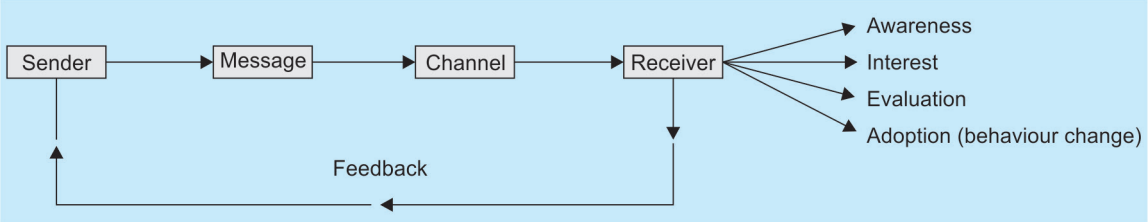

Figure: Communication process

TYPES OF COMMUNICATION

2. **Ans. (b) Didactic Method** *[Ref. Park 23/e p855]*
   TYPES OF COMMUNICATION:
   - *One-way communication* (*Didactic Metho*(d): Flow of communication is one way – from communicator to audience
     - *Disadvantages of one way communication*:
       - Knowledge is imposed and learning authoritative
       - Little audience participation and no feedback
       - Does not influence human behaviour
       - Makes no attempt at removing misconceptions and misunderstandings
       - Communicates message even if unintelligible or unacceptable
       - Autocratic process
     - *Examples of one way communication*:
       - Lecture method (Chalk and talk method)
       - Television
       - Radio
       - Newsprint
   - *Two-way communication (Socratic Method):* Two way communication in which both the communicator and the audience take part
     - *Advantages of two way communication*:
       - Active participatory and democratic process
       - More likely to influence human behaviour
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     - *Examples of two way communication:*
       - Focus Group Discussion (FGD)
       - Symposium
       - Panel discussion
   - *Verbal Communication*: Face-to-Face communication
     - *Advantages of verbal communication:*
       - May be loaded with hidden meanings
       - Persuasive

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- Non-verbal Communication: Indirect interaction
  - *Advantages of non-verbal communication*:
    - Silence speaks louder than words
- *Formal Communication*: Follows line of authority
- *Non-formal Communication*: Grape-vine communications
- Advantages: May be more active than formal channels
- *Visual Communication*: Comprises charts, graphs, pictograms, tables, maps, posters

3. **Ans. (b) Lecture** *[Ref. Park 23/e p855]*
4. **Ans. (a) Lecture** *[Ref. K Park 23/e p855]*
5. **Ans. (c) Demonstration; (d) Lecture** *[Ref. K Park 23/e p855]*
6. **Ans. (d) Panel discussion** *[Ref. K Park 23/e p855]*
7. **Ans. (b) Panel discussion** *[Ref. Park 23/e p865]*
   - *Features of a panel discussion*: '4-8 persons' who are qualified to talk about the topic sit and discuss a given problem/ topic in front of a target group or audience
   - Panel comprises, A chairman or moderator, 4-8 expert speakers

Review Question

8. **Ans. (d) Group Discussion** *[Ref. Park 23/e p855]*
9. **Ans. (d) Panel discussion** *[Ref. Park 23/e p855]*
10. **Ans. (b) High rich content** *[Ref. Park 23/e p855]*
11. **Ans. None** *[Ref. Park 23/e p855]*

COMMUNICATION METHODS

12. **Ans. (b) Delphi method** *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p31, 222]*
    Refer to Theory

Also Remember

- *Mini-Delphi* or *Estimate-Talk-Estimate* (*ETE*): The delphi technique when adapted for use in face-to-face meetings

13. **Ans. (b) Counselling** *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p48]*
    COUNSELLING:
    - *Definition*: Counselling is face-to-face communication through which a person is helped to make a decision or solve a problem
      - Counselling helps clients make informed choices
      - **COUNSELLING IS DIFFERENT FROM ADVICE:** In Counselling, *'Choice is given to clients'*
    - *Elements of Counselling*: (**GATHER** Approach)
      - **G:** Greet the clients (make them comfortable, give attention)
      - **A:** Ask/ ascertain needs/ problems or reasons for coming
      - **T:** Telling different methods/ options/ choices to solve the problem
      - **H:** Help client to make voluntary decisions
      - **E:** Explain fully the chosen decision/ action/ method
      - **R:** Return for follow-up visit
    - GATHER Approach can be used for counseling about contraceptives
14. **Ans. (a) Symposium** *[Ref. Park 23/e p865]*
    Refer to Theory
15. **Ans. (d) Interpersonal communication** *[Ref. Park 23/e p857, 863]*
    - Also known as One-to-One or Face-to-face communication
16. **Ans. (c) Flannelgraph** *[Ref. Park 23/e p863]*

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- *Audiovisual aids*: No health education can be effective without audiovisual aids
  - *Auditory aids*: radio, cassette tape-recorder, microphone, amplifier, earphone, public address system, disks
  - *Visual aids*:
    - *Not requiring projection*: Chalk-board, leaflets, posters, charts, flannelgraph, exhibits, models, specimens, diagrams, photographs
    - *Requiring projection*: Slides, filmstrips, overhead projector, epidiascope
  - *Combined A-V aids*: Television, sound films (cinem(a), synchronized slide-tape combination, multimedia, videotape system, drama, skits

17. Ans. (a) Not a very effective method of health communication *[Ref. Park 23/e p865]*

Also Remember

- *Sociogram*: Graphical representation of interaction among participants in a FGD
  - Sociogram helps in understanding whether there was equal participation from all participants in a FGD

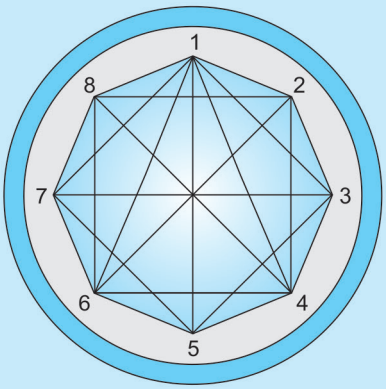

Figure: A good group discussion

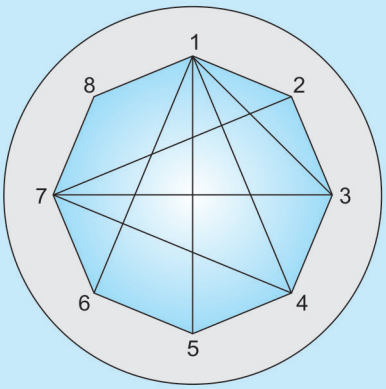

Figure: A dominated group. No. 1 and No. 7 dominate the discussion

18. Ans. (c) Demonstration *[Ref. Park 23/e p864]*

DEMONSTRATION:

- *Definition:* Is a carefully planned presentation to show how to perform a skill or procedure
- *Method:* Demonstrator carries out step-by-step in font of an audience and involves them
- *Advantages:*
  - Dramatises by arousing interest
  - Persuades onlookers to adopt
  - Upholds principles of 'seeing is believing' and 'learning by doing'
  - Can bring desirable changes in behaviour
- *Utility:*
  - Environmental sanitation (hand pump installation, use of sanitary latrine)
  - MCH (ORS technique)
  - Control of disease (Scabies)

19. Ans. (b) Group members should not have known each other before *[Ref. Park 23/e p864]*

20. Ans. (b) Discussion by 4-8 qualified persons *[Ref. Park 23/e p865]*

21. Ans. (c) Specific order, Set speeches *[Ref. K Park 23/e p865]*

22. Ans. (d) Documentary *[Ref. Park 23/e p863]*

- *Methods of Health communication*:

Individual approach	Group approach	Mass approach
Personal contact	Lectures	Television
Home visits	Demonstrations	Radio

Contd...

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Contd...

Personal letters	Discussion methods – Group discussion – Panel discussion – Symposium – Workshop – Conference – Seminar – Roleplay	Newspaper Printed material Direct mailing Posters Health museums/ exhibitions Folk methods Internet

Review Questions

23. Ans. (a) Individual approach *[Ref. Park 23/e p863]*

24. Ans. (a) Individual approach *[Ref. Park 23/e p863]*

HEALTH EDUCATION

25. Ans. (d) Punishment *[Ref. Park 23/e p861]*

- *Approaches to Health Education*:
- *Principles of Health Education*:
  - Credibility
  - Interest
  - Participation
  - Motivation
  - Comprehension
  - Reinforcement
  - Learning by doing
  - Known to unknown
  - Setting an example
  - Good human relations
  - Feedback
  - Leaders

Also Remember

- *Strandfield's '**Seven I**' principles of Health Education*:
  - **I**dentification
  - **I**nvolvement
  - **I**ndigenization
  - **I**ndoctrination
  - **I**ntegration
  - **I**nfluencers
  - **I**nnovation
- *Behaviour change induced by health education*: Occur in 3 phases:
  - *Phase I*: Awareness and interest
  - *Phase II*: Evaluation and trial
  - *Phase III*: Adoption and dissemination

26. Ans. (d) Mass media *[Ref. Park 24/e p858]*

27. Ans. (c) Health education *[Ref. K. Park 23/e p863]*

- Health education can be done individually BUT limitation is that the numbers we reach is really small, and health education is given to only those who come in contact with health system

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28. Ans. (a) Appeals to emotion *[Ref. K. Park 23/e p859]*

- *Health education versus propaganda/ publicity*:

	Health education	Health propaganda
Knowledge and skills	Actively acquired	Instilled in minds
Promotion of thought process	Present	Absent
Primitive desires	Disciplines	Arouses
Behaviour developed	Reflective behaviour	Reflexive behaviour
Appeals to	Reason	Emotion
Develops	Individuality, personality	Set attitudes, behaviour
Knowledge acquired by	Self-reliant activity	Passive spoon-feeding
Process	Behaviour centred	Information centred

29. Ans. (d) Motivation model *[Ref. Park 23/e p859]*

Motivation Model of Health education (Adoption Model)

- *Three stages in process of behavioural change*:
  - Awareness: Interest
  - Motivation: Evaluation, Decision-making
  - Action: Adoption, Acceptance
- *Internalization*: New idea/acquired behavior becomes part of own existing values

Review Question

30. Ans. (b) Flip charts *[Ref. Park 23/e p864]*

MISCELLANEOUS

31. Ans. (b) Gives greater support for concentrated programmes
[Ref. Park 24/e p855]

- *Mass media*: TV, radio, printed media
  - *Advantages of mass media*:
    - Reaches a relatively larger population in a shorter time than with other means
    - Useful for message transmission even in remote areas
    - More influential with average and below average education level
    - Get public attention
  - *Disadvantages of mass media*:
    - Being impersonal, not usually effective in changing established modes of behaviour if used alone
    - One way communication: Carry messages from centre to periphery; feedback mechanisms are poorly organized

32. Ans. (a) Television *[Ref. Park 23/e p866]*

- *Mass media* are mainly a one-way communication (Didactic Methods):
  - *Television:*
    - Most popular of all media
    - Creates awareness, influence public opinions and introduce new ways of life
    - Raise levels of understanding
    - Has much potential for health communication
    - Not much opportunity for feedback and discussion
  - *Radio:*
    - Purely didactic medium
    - Valuable aid in putting across health information
  - *Internet:*
    - Fast growing communication media
    - Holds very large potential to become a major health education tool

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- *Newspapers:*
  - Most widely disseminated of all forms of literature
  - Reach only to limited population (literates)
- *Printed material:*
  - Can convey detailed information
  - Produced in bulk at low cost, can be shared
- *Direct mailing:*
  - New innovation in health communication
- *Posters, billboards, signs:*
  - Can be displayed at public places
  - Less effective in changing behaviour
- Health museums and exhibitions
- Folk media

33. Ans. (a) Interpersonal Communication *[Ref. Park 23/e p863]*

- *Interpersonal Communication* (*IP*(C): 'Face-to-face communication' is the most persuasive and effective than other forms of communication
- *IPC is particularly useful for* influencing the decisions of undecided persons
- *Superiority of IPC over mass media* has been well documented

Review Question

34. Ans. (a) Sensitivity *[Ref. Park 23/e p857]*

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CHAPTER

14 Health Care in India, Health Planning and Management

HEALTH CARE IN INDIA

Health Planning Committees In India

1. *Bhore Committee (1946Q):*
   - Also known as 'Health Survey and Development Committee'Q
   - *Short term measureQ:* 1 PHC per 40,000 populationQ, 30 beds, 3 subcentres and 2 medical officers
   - *Long term measure (3 Million PlanQ):* Primary health units with 75-bedded hospitals per 10,000-20,000 population; Secondary health units with 650-bedded hospitals; Regional health units with 2,500 beds
   - Prepare 'Social PhysiciansQ' (3 months training in preventive and social medicine in medical education)
2. *Mudaliar Committee (1962):*
   - Also known as 'Health Survey and Planning Committee'Q
   - 1 PHC per 40,000 population maximumQ
   - Constitution of 'All India Health Service0'Q
   - Strengthen district hospitals with specialist services
   - Regional organizations in each state
3. *Chadah Committee (1963):*
   - Constituted to study arrangeme nts necessary for the 'Maintenance Phase of National Malaria Eradication Programmme (NMEP)'Q
   - Vigilance operations of NMEP should be the responsibility of general health services (PHCs at block level)
   - 1 Basic Health Worker per 10,000 population (for malaria vigilance, collection of vital statistics and family planning) Q
   - Family Planning Health Assistants to supervise 3-4 basic health workers
4. *Mukherji Committee (1965):*
   - 'Delink malaria activities from family planning'Q
   - Separate staff for family planning programme
5. *Mukherji Committee (1966):*
   - BASIC HEALTH SERVICE should be provided at block levelQ
6. *Jungalwalla Committee (1967):*
   - Also known as 'Committee on Integration of Health Services'Q
   - Unified cadre, common seniority, recognition of extra qualifications, 'equal pay for equal work', special pay for specialized work, 'no private practice' and good service conditionsQ
7. *Kartar Singh Committee (1973):*
   - Also known as 'Committee on Multipurpose Workers under Health and Family Planning'Q
   - ANMs to be replaced by 'Female Health Workers'; Basic health workers, Malaria surveillance workers, Vaccinators, Health education assistants and family planning health assistants be replaced by 'Male Health Workers'Q
   - 1 PHC for 50,000 population, 15-16 subcentres each for 3,000-3,500 population
   - Each subcentre be staffed by team of one male and one female health worker
   - 1 Male Health Supervisor per 3-4 male health workers and 1 Female Health Supervisor per 4 female health workersQ
   - Lady Health Visitors be designated as Female Health Supervisors
   - Doctor in charge of PHC should have overall charge of supervisors and health workers in his area

I Bhore Committee (1946Q): Short term measure: 1 PHC per 40,000 population

I Kartar Singh Committee (1973): 'Committee on Multipurpose Workers

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I Shrivastava Committee (1975): 'Group on Medical Education and Support Manpower' (ROME) Scheme 'Village Health Guide

8. *Shrivastava Committee (1975):*
   - Also known as 'Group on Medical Education and Support Manpower'Q
   - Create 'Bands of Para-professionals and Semi-professional health workers' from within the communityQ
   - Establish 2 cadre of health workers – Multipurpose Workers and Health Assistants between community level workers and doctors at PHCsQ
   - Development of 'Referral Services Complex' (between PHCs and higher level referral and services centers) Q
   - Establishment of 'Medical and Health Education Commission'Q
   - 'Reorientation of Medical Education' (ROME) SchemeQ
   - 'Village Health Guide (Community Health Worker) Scheme'Q
   - '3-tier rural health infrastructure' (Panchayat—Panchayat Samiti—Zila Parishad)Q
9. *Krishnan Committee (1983):*
   - 'Urban Revamping Scheme'Q
10. *Bajaj Committee (1986):*
    - Formulation of 'National Medical and Health Education Policy'Q
    - Formulation of 'National Health Manpower Policy'
    - 'Education Commission'
    - Health Manpower Cells

Primary Health Care

I Hallmarks of Primary Health Care: Affordability Acceptability Accessibility Availability

- *Definition:* Essential health care, based on practical, scientifically sound, and socially acceptable methods and technology, made universally accessible to individuals and families in the community, through their full participation and at a cost that the community and country can affordQ
- *Hallmarks of Primary Health CareQ:* 4 A's
  - Affordability
  - Acceptability
  - Accessibility
  - Availability
- *4 Principles/Pillars of Primary Health CareQ:*
  - Equitable distribution
  - Community Participation
  - Intersectoral Coordination
  - Appropriate Technology

Elements/Components of Primary Health Care (Alma-Ata Declaration, 1978)Q

I Elements/Components of Primary Health Care ELEMENTS

- **E:** Education concerning health problems and their control
- **L:** Locally endemic diseases prevention and control
- **E:** Essential drugs
- **M:** Maternal and child health care including family planning
- **E:** EPI (Immunization) against Vaccine Preventable Diseases
- **N:** Nutrition and promoting proper food supply
- **T:** Treatment of common diseases and injuries
- **S:** Safe water supply and sanitation

Functions of Primary Health CentreQ

- Medical care
- MCH including family planning
- Safe water supply and sanitation
- Locally endemic diseases prevention and control
- Collection and reporting of vital statistics
- Education concerning health
- National Health Programs

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- Referral services
- Training of health personnel
- Basic laboratory services

Levels of Primary Health Care System in India[Q]

- *Primary Level of Health Care:*
  - Is 'first level of contact between population and health care system' in India[Q]
  - Health services are delivered through[Q]:
    - Sub-centre
    - Primary Health Centre
- *Secondary Level of Health Care:*
  - Is 'First referral level of health care' in India[Q]
  - *Health services are delivered through:* Community Health Centre[Q]
- *Tertiary Level of Health Care:*
  - Is 'Second referral level of health care' in India[Q]
  - *Health services are delivered through:* Medical Colleges and Hospitals

I
Primary Level of Health Care:
1. Sub-centre
2. Primary Health Centre

Sub-centre

- *Staff of Sub-centre:* 3
  - Multi-purpose worker- male (MPW–M)[Q]
  - Multi-purpose worker- female (MPW–F)[Q]
  - Volunteer worker
- Is the 'most peripheral and first contact point' between the primary health care system and the community[Q]
- Ministry of Health & Family Welfare is providing '100% Central assistance'[Q]
- No. of Sub-centres in India: 1,52,326 [2014]

Primary Health Centre (PHC)

- *Staff of PHC:* 15[Q]
  - *Medical officer:* 1-2[Q]
  - Health assistant – Male[Q]
  - Health assistant – Female[Q]
  - Health educator
  - Other staff
- PHC is the first contact point between village community and the Medical Officer[Q]
- Each PHC acts as a 'Referral centre for 6 Sub-centers'[Q]
- Medical officer is the 'Leader of team at PHC'
- PHCs are established and maintained by the State Governments under the Minimum Needs Programme (MNP)/ Basic Minimum Services Programme (BMS)[Q]
- PHC has provision of '4 – 6 beds'[Q]
- *No. of PHCs in India:* 25,020 [2014][Q]

I
Staff of PHC: 15
PHC has provision of '4 – 6 beds'

Community Health Centre (CHC)

- *Staff of CHC:* 30-31[Q]
  - *Specialist Medical officers:* 4[Q]
    - Physician
    - Surgeon
    - Obstetrician & Gynaecologist
    - Paediatrician
  - *3 Additional new posts created under NRHM:*[Q]
    - Ophthalmic surgeon
    - Anaesthetist
    - Public health programme (PSM) manager
  - Other staff

I
Staff of CHC: 30-31

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I

Bed strength of CHC: 30

- Each CHC acts as a 'Referral centre for 4 PHCs'[Q]
- CHCs are being established and maintained by the State Government under MNP/BMS programme
- *Bed strength of CHC:* 30[Q]
- *No. of CHCs in India:* 5363 [2014]

Key Facts About Primary Health Care System

	Sub-centre	PHC	CHC
Level of care[Q]	Primary	Primary	Secondary
Population norm[Q] Plains Hilly/tribal areas	 5000 3000	 30,000 20,000	 1,20,000 80,000
Staff	3	15	30
Maintenance	Central govt.	State govt.	State govt.
Rural area covered	21 sq. km.	140 sq. km.	770 sq. km.
Radial distance covered	2.6	6.6	15.6
Average no. of villages covered[Q]	4	29	158

Staffing Pattern in Primary Health Care System

- *Staff at Subcentre*[Q]*:* Total 3
  - Male multipurpose worker (1)
  - Female multipurpose worker (1)
  - Volunteer (1)
- *Staff at Primary Health Centre (PHC)*[Q]*:* Total 15
  - Medical officer (1)
  - Health Assistant Male (1)
  - Health Assistant Female (1)
  - ANM, Pharmacist, UDC, LDC, BEE, Nurse-midwife, Lab. Technician, driver [all 1 each]
  - Class IV (4)
- *Staff at Community Health Centre (CHC)*[Q]*:* Total 30-31
  - 4 specialist medical officers (Surgeon, Physician, Obstetrician/Gynecologist, Pediatrician – 1 each)
  - 23-24 staff [Nurse-midwife (9), Dresser (1), Pharmacist (1), Radiographer (1), Lab. Technician (1), Ophthalmic Assistant (1), Ward boy (2), Sweepers (3), Chowkidar (1), OPD attendant (1), OT attendant (1), Statistical assistant (1), Registration clerk (1)]
  - *Proposed 3 new staff:* Anesthetist, Eye surgeon, Public health programme manager (1 each)

Population Norms for Health Workers in India[Q] [See Annexure 18 for current norms]

I

Health Assistant
1 per 30,000 population in plain area
Multi-purpose worker
1 per 5,000 population in plain area

- *Suggested norm for Health Assistant (male and female)*[Q]*:*
  - 1 per 30,000 population in plain area
  - 1 per 20,000 population in tribal and hilly areas
- *Suggested norm for Health Worker/Multi-purpose worker (male and female)*[Q]*:*
  - 1 per 5,000 population in plain area
  - 1 per 3,000 population in tribal and hilly areas
- *Suggested norm for Anganwadi worker*[Q]*:*
  - 1 per 400-800 population in plain area
  - 1 per 300-800 population in tribal and hilly areas

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Suggested Population Norms for Health Personnel

Health personnel	Norm suggested[Q]
Doctor[Q]	1 per 1000
Nurse[Q]	3 per 1 Doctor
Health worker (male and female)- MPW[Q]	1 per 5000 (plains) or 3000 (hilly)
Health assistant (male and female)[Q]	1 per 30000 (plains) or 20000 (hilly)
Pharmacist[Q]	1 per 10,000
Lab technician	1 per 10,000
ASHA[Q]	2 per 1000 (village)
Trained dai/ TBA[Q]	1 per 1000 (village)
Village health guide (VHG)[Q]	1 per 1000 (village)
Anganwadi worker (AWW)	1 per 400-800 (plains) or 300-800 (hilly)

I

Doctor 1 per 1000
Nurse[Q] 3 per Doctor
ASHA 2 per 1000

Rural Health Statistics 2015

- Number of Subcentres: 153, 655
- Number of PHCs[Q]: 25, 308
- Number of CHCs: 5396
- Number of District Hospitals: 763
- Number of districts[Q]: 672
- Number of villages: 640, 867
- Rural population: 68.9% [Census 2011]
- CBR[Q]: 21.4 [SRS 2014]
- CDR[Q]: 7.0 [SRS 2014]
- IMR[Q]: 40 [Highest MP/Assam 54; Lowest Goa 09] [SRS 2014]

Job Responsibilities of Health Worker – Female[Q]

- *Maternal and child health:* Register pregnant, Urine and Hb test, Refer, Conduct deliveries, 2 post-natal visits
- *Family planning:* Maintain eligible couple registers, distribute conventional and oral contraceptives, establish female depot holders
- *Medical termination of pregnancy:* Identification and referral
- *Nutrition:* Identify and referral, IFA, Vitamin A
- *Immunization:* TT in pregnancy, VPDs in children
- *Dai training:* List dais, Help health assistant in training
- *Communicable diseases:* Notify the medical officer as per guidelines
- Vital events record maintenance
- Record keeping
- Treatment of minor ailments
- Team activities

Job Responsibilities of Health Worker – Male[Q]

- Maintenance of records
- Making Malaria slides[Q]
- Identifying suspected cases of Malaria, Filariasis, Japanese encephalitis, Kala azar
- Identify diarrhoea/dysentery cases; give ORS
- Identify suspect Leprosy, TB cases; sputum collection; supervise MDT, DOTS
- Chlorinate water bodies; educate public
- Administer vaccines
- Distribute conventional contraceptives

I

Job Responsibilities of Health Worker – Male
Making Malaria slides

Panchayati Raj Institutions (PRIs)

- *Panchayati Raj System:* Is a 3-tier system of rural local self-government in India, linking village to the district[Q]

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I Panchayati Raj Institutions were strengthened in India by Constitution[Q]:
73rd amendment
74th amendment

- *Panchayati Raj Institutions were strengthened in India by Constitution[Q]:*
  - 73rd amendment
  - 74th amendment
- *The 3 level PRIs:*[Q]
  - *Panchayat:* Village level
  - *Panchayat Samiti/ Janapada Panchayat:* Block level
  - *Zila Parishad/ Zila Panchayat:* District level
- *Panchayati Raj at Village Level comprises of:* [Q]
  - Gram Sabha
  - Gram Panchayat
  - Nyaya Panchayat

District

- The principal unit of administration in India is the 'District under the Collector'[Q]
- *Within each district there are 6 types of administrative areas:*
  - Sub-divisions (each under a Sub-Collector or Assistant Collector)
  - Tehsils/Talukas (each under a Tehsildar; a tehsil comprises 200-600 villages)
  - Community Development Blocks (each under a Block Development Officer; a block comprises 100 villages and 80,000-1,20,000 population)
  - Municipalities and Corporations
  - Villages
  - Panchayats (Institutions of rural local self governments)

HEALTH PLANNING

Objectives and Goals of a Health Program

I Objective: Is planned end-point of all activities

- *Objective:* Is planned end-point of all activities[Q]
  - Is precise[Q]
  - Is concerned with the problem itself
- *Target:* A discrete activity which helps measure the extent of attainment of objectives[Q]
  - Is a concept of achievement[Q]
  - Is concerned with the factors involved in a problem
- *Goal:* Ultimate desired state towards which objectives and resources are directed[Q]
  - Is not constrained by time or existing resources
  - Is not necessarily attainable[Q]
- *Mission:* Is a description of fundamental principle of existence of a programme
  - Is usually time bound[Q]
  - Is a statement of purpose
- *Impact:* Is an expression of the positive effect of a programme, service or institution on the overall health development and on related social and economic development

National Population Policy (NPP) 2000

National Health Policy 2015 (Draft)

Goal: The attainment of the highest possible level of good health and well-being, through a preventive and promotive health care orientation in all developmental policies, and universal access to good quality health care services without anyone having to face financial hardship as a consequence.

Key Policy Principles

- Equity
- Universality
- Patient Centered & Quality of Care
- Inclusive Partnerships

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- Pluralism
- Subsidiarity
- Accountability
- Professionalism, Integrity and Ethics
- Learning and Adaptive System
- Affordability

Key Targets/Priority Areas

- "Health In All" approach[Q] as complement to Health For All.
- 7 Priority Action Areas[Q]: Swachh Bharat Abhiyan, Balanced and Healthy Diets, Nasha Mukti Abhiyan , Yatri Suraksha to ensure road and rail safety, Nirbhaya Nari for action against gender violence, Reduced stress and improved safety in the work place, Reducing indoor and outdoor air pollution
- Swasth Nagrik Abhiyan a social movement for health
- Public health expenditure: > 2.5% of the GDP[Q]
- Population to bed ratio: > 1000 beds per million population (1 per 1000)[Q]
- NUHM to cover all State capitals, District headquarters and Cities/towns with more than 50,000 populations[Q]
- Single digit Neonatal mortality and Stillbirth rates
- Increase the proportion of male sterilization from < 5% where it is currently, to > 30%[Q]
- *Leprosy:* Reduction to grade 2 disability to < 1 per million by 2020[Q]
- Life support ambulances linked to trauma management centers
  - 1 per 30 lakh population (Urban)
  - 1 per 10 lakh population (Rural)
- A nursing school in every large district/cluster of districts of about 20-30 lakh population
- A Common Entrance Exam on the pattern of NEET for UG entrance at All India level needs to be enforced. A Licentiate Exam will be introduced for all medical graduates with a regular renewal at periodic intervals with CME credits accrued. All Indian students studying medicine abroad should undertake a screening test to obtain registration with the regulatory body and the same should be applicable for Indian colleges as well to ensure the quality of medical graduates
- A robust National Health Accounts System needs to be operationalised

Steps of Planning Cycle[Q]

- *Pre-planning:*
  - Government interest
  - Legislation
  - Organization for planning
  - Administrative capacity
- *Step 1:* 'Analysis of health situation'
- *Step 2:* Establishment of goals and objectives
- *Step 3:* Assessment of resources
- *Step 4:* Fixing priorities
- *Step 5:* Write-up of formulated plan
- *Step 6:* Programming and implementation
- *Step 7:* Monitoring
- *Step 8:* Evaluation

TWELFTH FIVE YEAR PLAN (12th FYP) 2012-17 GOALS

Parameter	Goal by 2017
Infant mortality rate (IMR)	25 per 1000 live births
Maternal mortality ratio (MMR)	100 per 100,000 live births

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Total fertility ratio (TFR)	2.1
Under-3 year old malnutrition	Reduction by 50%
Anemia in 15-49 years old women	28%
0-6 years Child sex ratio	950
Poor household's out-of-pocket expenditure	Reduction
Non-communicable disease burden	Reduction
Communicable diseases burden	
Tuberculosis	Reduce incidence, mortality by 50%
Leprosy	Prevalence <1/10000, Incidence Zero in all districts
Malaria	Incidence <1/1000
Filariasis	Microfilaria prevalence <1% in all districts
Dengue	Case fatality rate <1%
Chikungunya fever	Containment of outbreaks
Japanese encephalitis	Mortality reduction by 30%
Kala azar	Elimination by 2015 (<1/10000 in all blocks)
HIV/AIDS	Zero new infections; Care & Support, ART to all PLHA

NITI (National Institute for Transforming India) Aayog

- *Description*: National Planning Commission (1951) of India has been renamed as NITI Aayog, 1st January 2015 onwards
- *Chairperson*: Prime Minister of India
- *Functions*:
  - Promote a rapid rise in the standard of living of the people by efficient exploitation of the resources of the country, increasing production and offering opportunities to all for employment in the service of the community
  - Assessment of all resources of the country, augmenting deficient resources, formulating plans for the most effective and balanced utilization of resources and determining priorities

HEALTH MANAGEMENT

Modern Management Techniques

I Cost Effectiveness Analysis (CEA)Q: Benefits are measured in natural units

- *Cost Minimization Analysis (CMA):* Comparison of costs of different interventions that are assumed to provide equivalent benefits
- *Cost Effectiveness Analysis (CEA)Q:* Benefits are measured in natural units (e.g. Life years gained, heart attacks avoided)
  - CEA is an expression of the desired effect of a programme, service, institution or support activity in reducing a health problem
  - CEA measures the degree of attainment of pre-determined objectives and targets
  - *Most comprehensive indicator of CEA:* Quality adjusted life years (QALYs) gainedQ
- *Cost Utility Analysis (CUA):* Comparison of costs and benefits of health technologies that impact both quality and quantity of life
  - CUA measures health benefits as healthy years; QALYs, DALYs (Disability adjusted life years), healthy year equivalent are used
  - CUA is multi-dimensional
  - *Most widely used measure of benefit in CUA:* Quality adjusted life years (QALYs)
- *Cost Benefit Analysis (CBA):* Benefits are measured in monetary termsQ
  - Human capital approach
  - Willingness to pay approach
- *Cost Accounting:* A quantitative management technique which provides basic data on cost structure of any programmeQ

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- *Input-Output Analysis:* An economic technique which enables calculations to be made of the effects of changing the inputs
- *Network Analysis:* Is the graphic plan of all events and activities to be completed in order to reach an end objective[Q]
  - *Programme Evaluation and Review Technique (PERT):* An arrow diagram representing the logical sequence in which events must take place. It aids in planning, scheduling and monitoring the project; allows better communication between various levels and helps furnish timely, updated progress reports[Q]
  - *Critical Path Method (CPM):* The 'longest path' of the network is called as critical path. If any activity along the critical path is delayed, entire project will be delayed[Q]
- *Systems Analysis:* Is a management technique of finding out the cost-effectiveness of the available alternatives[Q]
- *Planning Programming Budgeting System (PPBS):* It helps decision makers to allocate resources so as to help achieve objectives in the most efficient way
  - It allows grouping of activities related to each objective
  - *Zero Budget Approach:* All budgets start at zero and no one gets any budget that he cannot specifically justify on a year-to-year basis[Q]
- *Work Sampling:* Systematic observation and recording of activities of one or more individuals, carried out at pre-determined or random intervals[Q]
  - It provides quantitative measurement of various activities

I Critical Path Method (CPM): The 'longest path' of the network

MISCELLANEOUS

Evaluation of Health Services[Q]

- *Relevance:* Appropriateness (need) of a health service
- *Adequacy:* Sufficient attention to pre-determined course of action
- *Accessibility:* Proportion of population expected to use the service
- *Acceptability:* Socially and culturally acceptable
- *Effectiveness:* Extent of prevention/alleviation of underlying problem
- *Efficiency:* How well resources are utilized
- *Impact:* Overall effect of programme/service on health and development

Millennium Development Goals (MDGs)

- *Description:* In September 2000, 189 countries adopted UN Millennium Declaration. Millennium Development Goals (MDGs) Goals place health at the heart of development and represent commitments by governments
- *Baseline Year for MDGs:* 1990
- *Deadline year for MDGs:* 2015[Q]
- *There are 8 MDGs:*
  - *Goal 1:* Eradicate extreme poverty and hunger
  - *Goal 2:* Universalise primary education
  - *Goal 3:* Gender equality and women empowerment
  - *Goal 4:* Reduce child mortality[Q]
  - *Goal 5*: Improve maternal health[Q]
  - *Goal 6:* Combat HIV/AIDS, malaria and other disease (Tuberculosis)[Q]
  - *Goal 7:* Ensure environmental sustainability
  - *Goal 8:* Develop global partnerships for development
- 3 out of 8 goals, 8 out of 18 targets required to achieve them and 18 out of 48 indicators of progress are 'directly health related'[Q]
  - Goal 4, 5 and 6 are 'directly health related'[Q]
  - Goal 2 and 3 'do not pertain to health'.

I Deadline year for MDGs: 2015

I MDGs: 3 out of 8 goals are directly 'Health – related'

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MULTIPLE CHOICE QUESTIONS

HEALTH CARE IN INDIA

1. **One PHC is located for a population of:** *[AIPGME 1999]*
   (a) 5000
   (b) 30,000
   (c) 100,000
   (d) 500

2. **A subcentre in a hilly area caters to a population of:** *[AIPGME 2001]* *[Recent Question 2013]*
   (a) 1000
   (b) 2000
   (c) 3000
   (d) 5000

3. **Eligible Couple Register is maintained at:** *[AIIMS Dec 1997]*
   (a) Subcentre
   (b) PHC
   (c) CHC
   (d) District headquarters

4. **One health assistant male/female should be posted for every:** *[AIPGME 1991]*
   (a) 5000 population
   (b) 20000 population
   (c) 30000 population
   (d) 10 000 population

5. **Three-Tier system of Health care delivery in rural areas in India is based on the recommendations of:** *[AIIMS May 1993]*
   (a) Bhore Committee
   (b) Chadah Committee
   (c) Srivastava Committee
   (d) Mudalair Committee

6. **Elements of primary health care include all of the following *except*:** *[Recent Question 2014]* *[AIIMS Dec 1994]*
   (a) Adequate supply of safe water and basic sanitation
   (b) Prevention & control of local endemic diseases
   (c) Providing employment to every youth
   (d) Immunization against major infectious diseases

7. **Panchayati Raj System is a 3-tier system of rural local self-government in India. Match the institutions with levels:** *[AIPGME 1996]*
   A – Panchayat, I – Village level
   B – Panchayat Samiti, II – District level
   C – Zila Parishad, III – Block level
   (a) A-III, B-II, C-I
   (b) A-II, B-III, C-I
   (c) A-I, B-III, C-II
   (d) A-I, B-II, C-III

8. **Principal Unit of Administration in India is:** *[AIIMS Dec 1997]*
   (a) Centre
   (b) State
   (c) District
   (d) Village

9. **Match list A with List B:** *[AIPGME 2000]*

List A	List B
A. Shrivastava Committee	1. Malaria workers to look after FP work too
B. Chadah Committee	2. Integration of health services
C. Kartar Singh Committee	3. Led to creation of Health guides
D. Jungalwallah Committee	4. Led to creation of MPW

   (a) A3; B4; C1; D2
   (b) A3; B1; C4; D2
   (c) A2; B1; C4; D3
   (d) A2; B4; C1; D3

10. **A sub-centre is manned by:** *[AIIMS Nov 2007]*
    (a) Medical Officer
    (b) Multipurpose worker
    (c) Health Assistant
    (d) Aanganwadi worker

11. **Elements of primary health care include all of the following *except*:** *[AIIMS May 1994; AIPGME 03]*
    (a) Adequate supply of safe water and basic sanitation
    (b) Providing essential drugs *[AIIMS May 2014]*
    (c) Sound referral system
    (d) Health Education

12. **All of the following are Pillars of primary health care *except*:** *[Recent Question 2014]* *[AIPGME 1999]* *[UPSC CMS 2015]*
    (a) Equitable distribution
    (b) Community Participation
    (c) Health Education
    (d) Intersectoral Coordination

13. **Alma Ata conference was held in:** *[DPG 2005]*
    (a) 1948
    (b) 1956
    (c) 1977
    (d) 1978

14. **Health man power indicated by which of the following:** *[PGI June 2005]*
    (a) Doctor 1 per 3500 population
    (b) ANM 1 per > 1000 population
    (c) Lab technician 1 per 10000 population
    (d) Pharmacist 1 per 100000 population
    (e) MPW

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15. Population of 1000 is covered by: *[PGI Dec 2K]*
(a) Anganwadi worker
(b) Health assistant
(c) Trained Dai
(d) Village health guide

16. Function of PHC are: *[PGI June 03]*
(a) Referral services
(b) Family planning & referral services
(c) Basic laboratory services
(d) Specialist service
(e) Collection and reporting of viral statistics

17. Which of the following is the suggested norm for nurses In Indian population? *[Karnataka 2009]*
(a) 1 per 1000
(b) 1 per 2000
(c) 1 per 3000
(d) 1 per 5000

18. Function of Health worker female: *[PGI Dec 2K]*
(a) Perform 50% of deliveries
(b) Trains dais
(c) Enlist dais of the subcentre
(d) Chlorination of water
(e) Collectors of urine samples

19. Functions of female health worker includes:
(a) Visit 4 subcentres/month Health Assistment
(b) Enlist dais of the sub-centre *[PGI June 01]*
(c) Conduct 50% delivery
(d) Chlorination of water Health worth male
(e) Collection of urine sample

20. All of the following are state responsibility for health *except*: *[DPG 2006]*
(a) Vital statistics
(b) Promotion of research through research centers & ther bodies
(c) Prevention of adulteration
(d) Prevention of communicable disease

21. ASHA is posted at the: *[AIPGME 2010]*
(a) Village level
(b) Community Health Centre
(c) Primary Health Centre
(d) Sub-centre

22. Which of the following is a new concept in primary Health Care? *[AIPGME 2010]*
(a) Equitable distribution
(b) Community participation
(c) Qualitative enquiry
(d) Primary Health Care

23. Principles of Primary Health Care includes all *except*:
(a) Intersectoral coordination *[Recent Question 2013]*
(b) Appropriate technology *[DNB 2009]*
(c) Mainly coordinated by doctors
(d) Community participation

24. Following is/are the job(s) of Health worker male:
(a) Sputum collection *[PGI May 2011]*
(b) ORS distribution
(c) DOTS supervision
(d) Growth monitoring
(e) Environmental sanitation

25. Staff at PHC include: *[PGI November 2012]*
(a) Pharmacist
(b) Clerk
(c) Radiologist
(d) Laboratory technician
(e) Paediatrician

26. Which of the following is not a work of female multi-purpose health worker? *[Recent Question 2012]*
(a) Malaria surveillance
(b) Distribution of condoms
(c) Immunization
(d) Dots activities

27. With of the following is at sub-centre level?
(a) Zila parishad *[DNB December 2011]*
(b) Panchayat samiti
(c) Gram panchayat
(d) Gram sabha

28. Highest level of integration in health service is
(a) PHC *[DNB June 2009]*
(b) Sub centre
(c) CHC
(d) District hospital

29. Which of the following is true about female health worker? *[DNB June 2011]*
(a) Acts at PHC level
(b) Covers a population of 5000 population
(c) Chlorinates well at regular intervals
(d) Makes at least 3 post natal visits for each delivery

30. How many beds are there in PHC for indoor patients? *[DNB December 2011] [DNB 2012] [Recent Question 2012] [Recent Question 2013]*
(a) 2
(b) 3
(c) 6
(d) 9

31. Community health centre covers a population of:
(a) 10,000 to 20,000 *[DNB 2009, 2012]*
(b) 30,000 to 50,000
(c) 50,000 to 80,000
(d) 80,000 to 120,000

32. Emphasis shifted from urban to rural services:
(a) Equitable distribution *[Recent Question 2013]*
(b) Community participation
(c) Intersectoral coordination
(d) Community participation

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33. **Female health worker:** *[Recent Question 2012]* *[Recent Question 2014]*
    (a) Cover 100 population
    (b) Covers 1000 population
    (c) Covers 5000 population
    (d) Covers 30000 population

34. **Which of the following is not a work of anganwadi worker?** *[DNB 2012]*
    (a) Immunization of children
    (b) Non formal preschool education
    (c) Sanitation
    (d) Health education

35. **Minimum number of beds in community health centre:**
    (a) 4-6 *[Recent Question 2012]*
    (b) 15
    (c) 30
    (d) 100

36. **Most common operation done by an Ophthalmologist in district hospital:** *[AIIMS May 2013]*
    (a) Phacoemulsification
    (b) Trabeculectomy
    (c) Bilateral lamellar tarsal rotation
    (d) Dacrocystorhinostomy

37. **Staff at PHC include:** *[PGI November 2013]*
    (a) Radiographer
    (b) Pharmacist
    (c) Anesthetist
    (d) Pediatrician
    (e) Laboratory technician

38. **Multipurpose health worker works for population:**
    (a) 1000 *[Recent Question 2014]*
    (b) 3000
    (c) 100
    (d) 5000

39. **Functions of female health worker includes:**
    (a) Visit 4 sub-centers/month *[Recent Question 2014]*
    (b) Collection of blood sample
    (c) Conduct 50% delivery
    (d) Chlorination of water

40. **Following are Objectives of Indian Public Health Standards for Primary Health Centres *except*:** *[UPSC CMS 2015]*
    (a) Provision of comprehensive primary health care
    (b) Achievement of an acceptable quality of health care
    (c) Provision of accident and emergency care
    (d) Making services more responsive to the needs of the community

41. **Optimum unit of Preventive, Curative and Promotive services in Health Care is known as**
    (a) Appropriateness *[Recent Question 2015]*
    (b) Availability
    (c) Adequacy
    (d) Comprehensiveness

Review Questions

42. **One village health guide is for population of:**
    (a) 1000 *[DNB 2000, RJ 2004]*
    (b) 5000
    (c) 10000
    (d) 50000

43. **A subcentre caters the population of:** *[DNB 2000]*
    (a) 5,000
    (b) 10,000
    (c) 50,0000
    (d) 1 lac.

44. **Vaccine can be stored at subcentre for:**
    (a) 1 day *[DNB 2001]*
    (b) 7 days
    (c) 15 days
    (d) 30 days

45. **An ideal subcenter for a rural population should cater a population of:** *[DNB 2001, 2005, RJ 2002]*
    (a) 1000
    (b) 2000
    (c) 5000
    (d) 10000

46. **At the village level, the Panchayati Raj consists of all of the following *except*?** *[DNB 2003]*
    (a) Zila Parishad
    (b) Nyaya Panchayat
    (c) Gram Panchayat
    (d) Gram Sabha

47. **An subcenter for a population in plains should cater:**
    (a) 1000 *[DNB 2006]*
    (b) 2000
    (c) 5000
    (d) 10000

48. **Primary health care involves all *except*:**
    (a) Sanitation & water supply *[UP 2000]*
    (b) Sound referral center
    (c) Supply of essential drugs
    (d) Health education

49. **Village health guide scheme in introduced in:**
    (a) 1960 *[UP 2004]*
    (b) 1970
    (c) 1980
    (d) 1990

50. **"Mobile medical care" is provided services to all *except*:** *[UP 2005]*
    (a) Primary health care
    (b) Secondary health care
    (c) Tertiary health care
    (d) Near home based

51. **Community health centres covering a population of:**
    (a) 40 – 60,000 *[UP 2007]*
    (b) 60 – 80,000

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(c) 80 – 1.20,000
(d) None

52. In India under Norms Doctor-population ratio is: *[AP 2007]*
(a) 1:2500
(b) 1:3500
(c) 1:5000
(d) 1:7500

53. In Hilly area PHC caters population of: *[MP 2003] [RJ 2006]*
(a) 20,000
(b) 30,000
(c) 3,000
(d) 5,000

54. An example of secondary health care level would be: *[MP 2007]*
(a) Primary Health Center
(b) Sub center
(c) Community health center
(d) Aped health institutions

55. Which of the following is not a function of primary health center in India? *[MP 2008]*
(a) Medical Care
(b) Safe water supply
(c) Collection of vital statistics
(d) Supplementary functioning of under six children

56. Recommended numbers of population for primary Health Centres for a tribal area is: *[MH 2002]*
(a) 50,000
(b) 30,000
(c) 20,000
(d) 10,000

57. Recommended number of populations for primary health centers & subcenters for tribal area is: *[MH 2003]*
(a) 30,000 & 5000 respectively
(b) 20,000 & 3000 respectively
(c) 30,000 & 3000 respectively
(d) 20,000 & 5000 respectively

58. Panchayati Raj includes the following *except*: *[MH 2007]*
(a) Gram Panchayat
(b) Gram Sabha
(c) Nyaya Panchayat
(d) Nyaya sabha

59. Anganwadi worker demonstrating preparation of home made ORS to the mothers of under five children, is an example of? *[MH 2008]*
(a) Intersectoral coordination
(b) Community participation
(c) Appropriate technology
(d) All of the above

60. All are grass root level worker *except*: *[RJ 2001]*
(a) Anganwadi worker
(b) Village health assistant
(c) Dai
(d) Health assistant

61. A trained Dai caters for a population of: *[RJ 2003] [Recent Question 2013]*
(a) 1000
(b) 2000
(c) 3000
(d) 4000

62. Primary health care includes all, *except*: *[RJ 2006]*
(a) Treatment is done by a docter
(b) Equitable distribution
(c) Intersectorial coordination
(d) Appropriate technology

HEALTH PLANNING

63. Which of the following is a set point framed for long term plans but is yet something that cannot be quantified or measured? *[AIPGME 2009]*
(a) Target
(b) Goal
(c) Objective
(d) Mission

64. The National Population Policy of India has set the following goals *except*: *[AIPGME 04]*
(a) To bring down total fertility rate (TFR) to replacement levels by 2015
(b) To reduce the infant mortality rate to 30 per 1000 live births
(c) To reduce the maternal mortality rate to 100 per 100,000 live births
(d) 100 percent registration of births, deaths, marriages and pregnancies

65. "3-Million Plan" was proposed by: *[AIPGME 1991]*
(a) Kartar Singh Committee
(b) Mudaliar Committee
(c) Srivastava Committee
(d) Bhore Committee

66. Under the National Population Policy 2000, it is aimed to reduce the maternal mortality ratio to below:
(a) 100 per 100,000 live births *[MP 2007]*
(b) 200 per 100,000 live births
(c) 50 per 100,000 live births
(d) 150 per 100,000 live births

67. All of the following goals under NHP 2002 have to be achieved by 2010 *except*: *[AIIMS May 2004]*
(a) Reduce prevalence of blindness to 0.5%
(b) Reduce IMR to 30/ 100 and MMR to 100/Lakh
(c) Increase utilization of Public health facilities from <20% to >75%
(d) Eliminate Lymphatic Filariasis

68. Recommendations of Bhore Committee include:
(a) Constitution of All India Health Service on the pattern of IAS *[AIIMS May 1995]*
(b) Separate staff for Family Planning Programme
(c) Creation of "Bands of para-professionals & semi-professional health workers"
(d) Major changes in Medical education to prepare "Social Physicians"

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69. Multi-purpose worker scheme in India was introduced following the recommendation of: *[AIPGME 2004]*
(a) Srivastava Committee *[Recent Question 2012]*
(b) Bhore Committee *[Recent Question 2014]*
(c) Kartar Singh Committee
(d) Mudaliar Committee

70. Under NHP 2002, all of the following are correctly matched *except*: *[AIPGME 2007]*
(a) Achieve zero level growth of HIV/AIDS – 2010
(b) Eliminate Lymphatic Filariasis – 2015
(c) Reduce IMR to 30/100 and MMR to 100/ Lakh – 2010
(d) Increase health sector spending from 5.5% to 7% of the budget – 2005

71. Match the following names of health committees in India: *[AIPGME 1991]*
A – Bhore Committee
B – Mudaliar Committee
C – Jungalwallah Committee
D – Kartar Singh Committee
I – Health Survey & Development Committee
II – Committee on MPWs under Health & Family Planning
III – Committee on Integration of Health Services
IV – Health Survey & Planning Committee
(a) A-I, B-III, C-II, D-IV
(b) A-I, B-IV, C-III, D-II
(c) A-IV, B-I, C-III, D-II
(d) A-I, B-IV, C-II, D-III

72. A group on Medical Education & Support Manpower was popularly known as: *[AIIMS Sep 1996]*
(a) Kartar Singh Committee
(b) Mudaliar Committee
(c) Srivastava Committee
(d) Bhore Committee

73. Planning Cycle has got several steps: *[AIPGME 1993]*
Monitoring & evaluation – a
Programming & implementation – b
Assessment of resources – c
Analysis of existing health situation – d
Logical sequence in planning cycle would be
(a) a b c d
(b) d c b a
(c) d b c a
(d) c d b a

74. A 3 year graduate MBBS programme was suggested by which committee? *[AIIMS May 2013]*
(a) Sundar Committee
(b) Srivastava Committee
(c) Expert Level Committee on Universal Health Coverage
(d) Krishnan Committee

75. Planning cycle includes: *[Recent Question 2013]*
(a) Analysis of situation
(b) Evaluation
(c) Resource assessment
(d) All

76. Concept of multipurpose workers was given by:
(a) Mudaliar committee *[DNB 2008]*
(b) Srivastava committee
(c) Kartar singh committee
(d) Mukherjee committee

77. Set of statement for monitoring Progress towards goal is referred as:
(a) Target *[DNB December 2011] [DNB December 2010]*
(b) Objective
(c) Programme
(d) Procedure

78. Bajaj committee, true is: *[Recent Question 2013]*
(a) Constituted in 1946
(b) Recommends formation of PHC
(c) Recommends health manpower policy
(d) None

79. Integration of health services was first proposed by:
(a) Bhore committee *[DNB June 2009]*
(b) Jungallwalla commitee
(c) Mudaliar commitee
(d) Srivastava committee

80. Bajaj committee in 1986 proposed: *[DNB December 2010]*
(a) Multipurpose health worker
(b) Manpower and planning
(c) Rural health service
(d) Integrated health services

81. Rural health scheme introduced by: *[DNB June 2011]*
(a) Bhore committee
(b) Mukherjee commitee
(c) Shrivastava committee
(d) Mudaliar committee

82. Universal Health Coverage of India was recently approved by which health committee? *[AIIMS May 2014]*
(a) Medical education health group
(b) MPW in health and family planning
(c) High level expert group
(d) Health survey and development committee

83. Which article of Indian Constitution confers 'Right to life' to citizens of India? *[Recent Question 2014]*
(a) Article 11
(b) Article 21
(c) Article 23
(d) Article 25

Review Questions

84. Concept of multipurpose workers was given by:
(a) Mudaliar committee *[DNB 2008]*
(b) Srivastava committee
(c) Kartar Singh committee
(d) Mukherjee committee

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85. **All are included in health sector policy in India *except*:** *[UP 2000]*
(a) Nutritional supplements
(b) Medical education
(c) Family welfare programme
(d) Control of communicable disease

86. **3 month's training in preventive and social medicine during internship is recommended by:** *[UP 2005]*
(a) Bhore committee
(b) Chadah committee
(c) Mudaliar committee
(d) Mukerji - committee

87. **Health Survey & Development Committee is given by:**
(a) Mudaliar *[AP 2002]*
(b) Bhore
(c) Srivasthava
(d) Mukharji

88. **Not used in health care planning:** *[AP 2008]*
(a) Increasing demands for resources
(b) To match with limited resources
(c) To plan best course of action
(d) To decrease wastage

89. **Each subcenter should be staffed by one male and one female health worker. It was recommended by:**
(a) Bhore committee *[MP 2001]*
(b) Mudaliar committee
(c) Chaddah committee
(d) Kartar Singh committee

90. **Recommendation of the Krishnan committee was for:**
(a) Local dai *[MP 2003]*
(b) Village health guides
(c) Integration of PHCs
(d) Abolition of private practise

91. **3 month training of doctors in social and preventive medicine was suggested by:** *[MP 2004]*
(a) Bhore committee
(b) Mudliar committee
(c) Shrivastava committee
(d) Kartar Singh committee

92. **Which of the following health committee recommended a medical and health education commission for reform in health and medical education on the times of University Grants Commission?** *[MP 2008]*
(a) Shrivastav Committee
(b) Mukerji Committee
(c) Chadah Committee
(d) Kartar Singh Committee

93. **Who among the following is Chairman of Central Council for Health?** *[MH 2003]*
(a) Prime minister
(b) Secretary of health
(c) Union health minister
(d) Director General of Health Sciences

94. **PHC was introduced as result of report:** *[RJ 2006]*
(a) Bhore committee
(b) Kartar Singh committee
(c) Mudaliar committee
(d) Shrivastav committee

95. **Multipurpose worker scheme in India was introduced following the recomendation of:** *[RJ 2006]*
(a) Shrivastav Committee
(b) Kartar Singh Committee
(c) Mudaliar Committee
(d) Shrivastav Committee

96. **Correct sequence of cycle is:** *[RJ 2007]*
(a) Planning, Evaluation, Object, Goal
(b) Planning, Object, Goal, Evaluation
(c) Planning, Object, Evaluation, Goal
(d) Planning, Goal, Evaluation, Object

97. **Chadah committees recommended all *except*:** *[RJ 2007]*
(a) PHC at the block level
(b) Concept of multipurpose worker
(c) One basic health worker per 10,000 populations
(d) The family planning Health assistants were to supervise 3 to 4 of this basic health worker

HEALTH MANAGEMENT

98. **Most comprehensive indicator of Cost Effectiveness Analysis is:** *[AIIMS Dec 1997]*
(a) No. of life years gained
(b) No. of heart attacks avoided
(c) QALYs gained
(d) Cost per life year gained

99. **Time taken for any project is estimated by:**
(a) Work sampling *[AIIMS Nov 2005]*
(b) Input-output analysis
(c) Network analysis
(d) Systems analysis

100. **Which one of the following is not a source of manager's power?** *[AIPGME 2005]*
(a) Reward
(b) Coercive
(c) Legal
(d) Efferent

101. **The management technique which is more promising tool for application in health field is:** *[AIPGME 2008]*
(a) Cost effective analysis
(b) Cost benefit analysis
(c) Cost accounting
(d) Input output analysis

102. **Economic benefits of any programme are compared with the costs incurred in:** *[AIIMS Nov 2007]*
(a) Cost benefit analysis
(b) Cost effective analysis
(c) Cost accounting
(d) Network analysis

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103. All are true regarding Critical Path Method (CPM) *except*: *[AIIMS May 1994]*
(a) Is a part of Input-Output analysis
(b) Visualised in graphical representation of all events/activities carried out
(c) Is the longest part of the network
(d) Any delay in CP delays whole project

104. When the economic benefits of any programme are compared with the cost of the programme it is called:
(a) Cost-benefit analysis *[Karnataka 2007]*
(b) Cost effective analysis
(c) Cost-accounting
(d) Input-output analysis

105. In Management "Goal" refers to: *[Karnataka 2007]*
(a) Planned end point of all activity
(b) Discrete activity
(c) Ultimate desired state towards which objectives and resources are directed
(d) Analysis of health Situation

106. In health management, Cost benefit analysis is an example of: *[NUPGET 2013]*
(a) Critical path method
(b) Program evaluation and review technique
(c) Management by objectives
(d) Total Quality management

107. Systemic observation and recording of activities of one/more individuals carried out at predetermined/ random intervals: *[Recent Question 2012]*
(a) Decision making
(b) Systems analysis
(c) Network analysis
(d) Work sampling

108. PERT technique is used in following:
(a) Network analysis *[DNB December 2011]*
(b) Cost effective analysis
(c) Input output analysis
(d) System analysis

109. True about "Zero base budgeting" is: *[DNB June 2010]*
(a) Relies on data of previous budget
(b) Proceeds from resources to target
(c) Proceeds from target to resource
(d) Not a priority based budgeting

110. Analysis done for expenditure of large proportion for small number and vice versa: *[Recent Question 2012]*
(a) ABC
(b) SDE
(c) VED
(d) FSN

111. "Critical Path" in Network Analysis is: *[AP 2014]*
(a) Most expensive path in a network
(b) Congested path in a network
(c) Shortest path in a network
(d) Longest path in a network

112. Which one of the following is a quantitative method of health management? *[UPSC CMS 2015]*
(a) Cost effectiveness analysis
(b) Human Resource Management
(c) Communication management
(d) Supportive supervision and leadership

Review Questions

113. All of the following are included in methods based an behavioural sciences *except*: *[DNB 2002]*
(a) Personal management
(b) System analysis
(c) Management by objectives
(d) Communication

114. The graphic plan of all events and activities to be completed in order to reach an end objective is called: *[DNB 2002]*
(a) Network analysis
(b) Cost accounting
(c) Work sampling
(d) Job chacting

115. PERT is a technique for? *[DNB 2003]*
(a) Network Analysis *[Karnataka 2006]*
(b) Cost-effective Analysis
(c) Input-Output Analysis
(d) System Analysis

116. All of the following are included in methods based an behavioural sciences *except*: *[DNB 2005]*
(a) Personal management
(b) System analysis
(c) Management by objectives
(d) Communication

117. Qualities of a leader are all *except*: *[Kolkata 2008]*
(a) Leading from the front
(b) Burning/breaking of bridges
(c) Courageous
(d) Fights instantly

118. PERT is associated with: *[Kolkata 2009]*
(a) Qualitative analysis
(b) Quantitative analysis
(c) Behavioral analysis
(d) none

119. PERT & critical path methods are employed in:
(a) Community education *[MP 2003]*
(b) Healthy planning
(c) Management
(d) Health survey

120. True about rural health services in India: *[MP 2004]*
(a) Pharmacists are more than lab technician
(b) Male health worker are more than female health worker
(c) Doctors are more than nurses
(d) Pediatricians are more than Gynecologist

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121. A study was conducted among nursing staff to find out time taken in different aspects of patient care viz., bed preparation, monitoring of vital diagnosis, attending doctor's rounds, blood sampling, drug administration. Which management technique would be applied for the analysis? *[MP 2008]*
(a) Critical path method
(b) Input-output analysis
(c) Systems analysis
(d) Work sampling

122. Cost-benefit is best analysed by: *[MH 2002]*
(a) Network analysis
(b) Benefit analysis
(c) ROME
(d) Slow pathway

123. Monetary terms involve: *[MH 2002]*
(a) Cost-benefit analysis
(b) Network analysis
(c) Slow Pathway
(d) All

MISCELLANEOUS

124. Drugs A & B are both used for treating a particular skin infection. After one standard application, drug A eradicates the infection in 95% of both adults and children. Drug B eradicates the infection in 47% of adults & 90% of children. There are otherwise no significant pharmacological differences between the two drugs, and there are no significant side effects. However, the cost of drug A is twice that of drug B. Dr. Sunil, a general practitioner, always uses drug B for the first treatment, and resorts to drug A if the infection persists. Dr. Sudhir, another general practitioner, always uses drug A for adults and drug B for children. Ignoring indirect costs, which of the following statement is incorrect? *[AIPGME 02]*
(a) Drug A is more effective than B for treating children
(b) Drug A is more cost-effective than drug B for treating children
(c) Drug A is more cost-effective than drug B for treating adults
(d) Dr. Sudhir's regime achieves a higher level of cost-effectiveness than Dr. Sunil's

125. According to the World Health report 2000, India's health expenditure is: *[AIPGME 2006]*
(a) 4.8% of G.D.P
(b) 5.2% of G.D.P
(c) 6.8% of G.D.P
(d) 7% of G.D.P

126. Indian (economic) real GDP growth for the year 2003 is: *[AIPGME 2006]*
(a) 6.0
(b) 6.5
(c) 7.8
(d) 10.5

127. All the following are health policy indicators *except*: *[AIIMS June 1997]*
(a) Political commitment to health for all
(b) Resource allocation
(c) Disability prevalence
(d) Community involvement

128. All are Elements of Evaluation *except:* *[AIIMS May 2005]*
(a) Repeatability
(b) Relevance
(c) Acceptability
(d) Effectiveness

129. All of the following targets in MDGs have to be achieved by 2015 except: *[AIIMS May 2008]*
(a) Reduce by 2/3 the under five-mortality rate
(b) Reduce by ¾ the Maternal Mortality Ratio
(c) Halve the proportion of people who suffer from hunger
(d) Achieve a significant improvement in lives of 100 million slum dwellers

130. Total no. of districts in India are: *[AIPGME 2004]*
(a) 304
(b) 404
(c) 504
(d) 604

131. Date set globally for achievement of MDGs is: *[AIPGME 2007]*
(a) 2010
(b) 2015
(c) 2025
(d) 2050

132. Which of the following are referred to as "Ivory Towers of Disease": *[AIIMS Nov 1993]*
(a) Small health centres
(b) Large hospitals
(c) Private practitioners
(d) Health Insurance Companies

133. Number of health related goals in millennium development goals? *[AIIMS May 2013]*
(a) 1
(b) 2
(c) 3
(d) 4

134. According to MDG child mortality has to be reduced by how much by 2015? *[Recent Question 2013]*
(a) One third
(b) Half
(c) Two third
(d) One fourth

135. Millennium developmental goal pertaining to HIV/AIDS: *[Recent Question 2013]*
(a) 6
(b) 3
(c) 8
(d) 1

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136. Millennium development goal 4 targets to reduce maternal mortality rate by: *[JIPMER 2014]*
(a) 0.25
(b) 0.50
(c) 0.75
(d) 1.00

137. Millennium Development Goals were launched by *[Recent Question 2015]*
(a) WHO in 1998
(b) UN in 2000
(c) WHO in 2000
(d) UN in 1998

Review Questions

138. Antenatal support is not delivered by: *[AP 2005]*
(a) Anganwadi worker
(b) Female Health worker
(c) Female Health assistant
(d) Traditional birth attendant

139. All of the above following are peripheral level health workers *except*: *[TN 2003]*
(a) Village Health Guide
(b) Gram Sevak
(c) Anganwadi worker
(d) Local Dai

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EXPLANATIONS

HEALTH CARE IN INDIA

1. Ans. (b) 30,000 *[Ref. Park 23/e p904-905]*

PRIMARY HEALTH CARE SYSTEM IN INDIA:

- *Primary Level of Health Care*:
  - Is *'first level of contact between population and health care system'* in India
  - *Health services are delivered through*:
    - Sub-centre
    - Primary Health Centre
- *Secondary Level of Health Care*:
  - Is *'First referral level of health care'* in India
  - *Health services are delivered through*: Community Health Centre
- *Tertiary Level of Health Care*:
  - Is *'Second referral level of health care'* in India
  - *Health services are delivered through*: Medical Colleges and Hospitals

SUB-CENTRE:

- *Staff of Sub-centre*: 3
  - Multi-purpose worker- male (MPW–M)
  - Multi-purpose worker- female (MPW–F)
  - Volunteer worker

PRIMARY HEALTH CENTRE (PHC):

- *Staff of PHC*: 15
  - *Medical officer:* 1 – 2
  - Health assistant – Female
  - Other staff
  - Health assistant – Male
  - Health educator

COMMUNITY HEALTH CENTRE (CHC):

- *Staff of CHC*: 30-31
  - *Specialist Medical officers*: 4
    - Physician
    - Surgeon
    - Obstetrician & Gynaecologist
    - Paediatrician
  - *3 Additional new posts created under NRHM*:
    - Ophthalmic surgeon
    - Anaesthetist
    - Public health porgramme manager
  - Other staff

KEY FACTS ABOUT PRIMARY HEALTH CARE SYSTEM:

	Sub-centre	PHC	CHC
Level of care	Primary	Primary	Secondary
Population norm			
Plains	5000	30,000	1,20,000
Hilly/ tribal areas	3000	20,000	80,000
Staff	3	15	30
Maintenance	Central govt.	State govt.	State govt.
Rural area covered	21 sq. km.	140 sq. km.	770 sq. km.
Radial distance covered	2.6	6.6	15.6
Average no. of villages covered	4	29	158

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2. **Ans. (c) 3000** *[Ref. Park 23/e p903]*
   - *Population norms for Health centres in India*:

	Primary health care system			ICDS system
Centre	**Sub-centre**	**PHC**	**CHC**	**Anganwadi**
Level of care	Primary	Primary	Secondary	–
Population norm				
Plain	5000	30,000	1,20,000	400-800
Hilly/ tribal areas	3000	20,000	80,000	300-800

Also Remember

- Suggested norm for Health Assistant (male and female):
  - *1 per 30,000 population in plain area*
  - *1 per 20,000 population in tribal and hilly areas*
- Suggested norm for Health Worker/Multi-purpose worker (male and female):
  - *1 per 5,000 population in plain area*
  - *1 per 3,000 population in tribal and hilly areas*
- Suggested norm for Anganwadi worker:
  - *1 per 400-800 population in plain area*
  - *1 per 300-800 population in tribal and hilly areas*

3. **Ans. (a) Subcentre** *[Ref. Park 21/e p840, 845, Park 22/e p844, 849]*

Also Remember

- Eligible Couple Register is maintained at subcentre, primarily by female multipurpose health worker
- 'Eligible Couple Register' is a basic document for organizing family planning work. It is regularly updated by each functionary of the family planning programmer, for the area falling within his jurisdiction
- 'Each subcentre is manned by one male and one female multipurpose worker'

4. **Ans. (c) 30000 population** *[Ref. Park 23/e p912-914]*

5. **Ans. (c) Srivastava Committee** *[Ref. Park 23/e p875]*
   - Three-Tier system of Health care delivery in rural areas in India is based on the recommendations of Srivastava Committee

Also Remember

- **Shrivastava Committee (1975):** *'Group on Medical Education and Support Manpower'*
  - Create *'Bands of Para-professionals and Semi-professional health workers'* from within the community
  - Establish 2 cadre of health workers – Multipurpose Workers and Health Assistants between community level workers and doctors at PHCs
  - Development of *'Referral Services Complex'* (between PHCs and higher level referral and services centers)
  - Establishment of *'Medical and Health Education Commission'*
  - *'Reorientation of Medical Education'* (ROME) Scheme
  - *'Village Health Guide* (*Community Health Worker*) *Scheme'*
  - *'3-tier rural health infrastructure'* (Panchayat — Panchayat Samiti — Zila Parishad)

6. **Ans. (c) Providing employment to every youth** *[Ref. Park 23/e p890-891]*
   - 8 essential **ELEMENTS**/components of Primary Health Care (as outlined by the *'Alma-Ata Declaration, 1978'*):
     - **E:** Education concerning health problems and their control
     - **L:** Locally endemic diseases prevention and control
     - **E:** Essential drugs
     - **M:** Maternal and child health care including family planning
     - **E:** EPI (Immunization) against Vaccine Preventable Diseases
     - **N:** Nutrition and promoting proper food supply

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- **T:** Treatment of common diseases and injuries
- **S:** Safe water supply and sanitation

7. **Ans. (c) A-I, B-III, C-II** *[Ref. Park 23/e p881]*
   - *The Panchayati Raj System*: Is a 3-tier system of rural local self-government in India, linking village to the district. *The 3 institutions are:*
     - *Panchayat*: Village level
     - *Panchayat Samiti/ Janapada Panchayat*: Block level
     - *Zila Parishad/ Zila Panchayat*: District level

Also Remember

- *Panchayati Raj at Village Level comprises of*:
  - Gram Sabha
  - Gram Panchayat
  - Nyaya Panchayat
- *Panchayati Raj Institutions were strengthened in India by Constitution* :
  - 73rd amendment
  - 74th amendment

8. **Ans. (c) District** *[Ref. Park 23/e p880]*
   - The principal unit of administration in India is the '*District under the Collector*'

Also Remember

- *Within each district there are 6 types of administrative areas*:
  - Sub-divisions (each under a Sub-Collector or Assistant Collector)
  - Tehsils/Talukas (each under a Tehsildar; a tehsil comprises 200-600 villages)
  - Community Development Blocks (each under a Block Development Officer; a block comprises 100 villages and 80,000 – 1,20,000 population)
  - Municipalities and Corporations
  - Villages
  - Panchayats (Institutions of rural local self governments)
- *Urban areas of district are organized in to following institutions of local self government*:
  - Town Area Committees (for populations 5,000 – 10,000)
  - Municipal Boards (for populations 10,000 – 2,00,000)
  - Corporations (for populations over 2,00,000)

9. **Ans. (b) A3; B1; C4; D2** *[Ref. Park 23/e p873-875]*
10. **Ans. (b) Multipurpose worker** *[Ref. Park 21/e p840, Park 22/e p844]*
11. **Ans. (c) Sound referral system** *[Ref. Park 23/e p902]*

PRIMARY HEALTH CARE:

- *Definition*: Essential health care, based on practical, scientifically sound, and socially acceptable methods and technology, made universally accessible to individuals and families in the community, through their full participation and at a cost that the community and country can afford

Also Remember

- *Hallmarks of Primary health care*: **4 A's**
  - Affordability
  - Acceptability
  - Accessibility
  - Availability
- *4 Principles/Pillars of Primary Health Care:*
  - Equitable distribution
  - Community Participation
  - Intersectoral Coordination
  - Appropriate Technology

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12. **Ans. (c) Health Education** *[Ref. Park 23/e p902]*

13. **Ans. (d) 1978** *[Ref. Park 23/e p890-891]*
ALMA-ATA CONFERENCE:
- Took place in USSR in 1978
- It gave the concept of 'Primary Health Care' (and its 8 elements)
- Called for WHO goal of 'Health for All by 2000'
- India is a signatory

14. **Ans. (c) Lab technician 1 per 10000 population** *[Ref. Park 22/e p841]*
Suggested norm for health personnel:

Health personnel	Norm suggested
Doctor	1 per 1000
Nurse	3 per 1 Doctor
Health worker (male and female)- MPW	1 per 5000 (plains) or 3000 (hilly)
Trained dai/ TBA	1 per 1000 (village)
Health assistant (male and female)	1 per 30000 (plains) or 20000 (hilly)
Pharmacist	1 per 10,000
Lab technician	1 per 10,000
ASHA	2 per 1000 (village)
Village health guide (VHG)	1 per 1000 (village)
Anganwadi worker (AWW)	1 per 400 – 800 (plains) or 300 – 800 (hilly)

15. **Ans. (c) Trained Dai; (d) Village health guide** *[Ref. Park 23/e p900]*
- *Population covered by health workers*:

Health worker	Population covered
Anganwadi worker	400-800
Trained Dai	1000
Village Health Guide	1000
ASHA (NRHM)	1000 (2 ASHAS per 1000 population)
USHA (NUHM)	1000 – 2500
Health Assistant	30000 (20000 in Hilly areas)
Multi-purpose worker	5000 (3000 in Hilly areas)

16. **Ans. (a) Referral services; (b) Family planning & referral services; (c) Basic laboratory services; (e) Collection and reporting of vital statistics** *[Ref. Park 23/e p904-905]*

17. **Ans. (d) 1 per 5000** *[Ref. Park 23/e p900]*

18. **Ans. (a) Perform 50% deliveries; (c) Enlist dais of the subcentre** *[Ref. Park 23/e p908-909]*

19. **Ans. (b) Enlist dais of the sub-centre; (c) Conduct 50% delivery** *[Ref. Park 23/e p908-909]*

20. **Ans. (b) Promotion of research through research centres & other bodies** *[Ref. Park 22/e p820, 821]*
- *Concurrent list under Union Ministry of Health and Family Welfare includes*: [responsibility of both Union and State governments] **[Mnemonic: V CLAPPED]**
  - **V**ital statistics
  - **C**ommunicable diseases spread prevention
  - **L**abour welfare
  - **A**dulteration of food prevention
  - **P**orts other than major
  - **P**opulation control and family planning
  - **E**conomic and social planning
  - **D**rugs and poisons control

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21. **Ans. (a) Village level** *[Ref. Park 23/e p914]*
22. **Ans. (c) Qualitative enquiry** *[Ref. Internet]*
    - 'Qualitative enquiry' in primary health care avoids advance decisions about what exactly is to be discovered and asks open questions to explore new interpretations.
23. **Ans. (c) Mainly coordinated by doctors** *[Ref. K. Park 23/e p902]*
24. **(a) Sputum collection; (b) ORS distribution; (c) DOTS supervision; (e) Environmental sanitation** *[Ref. K. Park 23/e p910-911]*
25. **Ans. (a) Pharmacist; (b) Clerk; (d) Laboratory technician** *[Ref. K Park 23/e p906]*
26. **Ans. (a) Malaria surveillance** *[Ref. K Park 22/e p849-50]*
27. **Ans. (c) Gram Panchayat** *[Ref. K Park 23/e p881]*
28. **Ans. (d) District hospital** *[Ref. MOHFW Annual Report 2011-12]*
29. **Ans. (b) Covers a population of 5000 population** *[Ref. K Park 23/e p908-909]*
30. **Ans. (c) 6** *[Ref. K Park 23/e p904-905]*
31. **Ans. (d) 80,000 to 120,000** *[Ref. K Park 23/e p907]*
32. **Ans. (a) Equitable distribution** *[Ref. K Park 22/e p832]*
33. **Ans. (c) Covers 5000 population** *[Ref. K Park 23/e p908-909]*
34. **Ans. (c) Sanitation** *[Ref. K Park 23/e p903]*
35. **Ans. (c) 30** *[Ref. K. Park 23/e p907]*
36. **Ans. (a) Phacoemulsification** *[Ref. IPHS Standards: Guidelines for District Hospitals 2012, Government of India, 2012, p 10]*

Ophthalmologic services at District hospital

OPD Procedures	IPD Procedures
Refraction (by using snellen's chart)	Examination under GA
Refraction (by auto refrectro meter)	Canthotomy
Syringing and Probing	Paracentesis
Foreign Body Removal (conjuctival)	Air Injection & Resuturing
Foreign Body Removal (Corneal)	Enucleation with Implant
Epilation	Enucleaion without Implant
Suture Removal	Perforating Coneo Scleral Injury Repair
Sub-conjuctival Injection	Cataract Extraction with IOL
Retrobular Injection (Alcohol etc.)	Glaucoma (Trabeculectomy)
Tonometry	Cutting of Iris Prolapse
Biometry/Keratometry	Small Lid Turnour Excision
Automated Perimetry	Conjuctival Cyst
Pterygium Excision	Capsulotomy
Syringing & Probing	Ant. Chamber Wash
I & C of chalazion	Evisceration
Wart Excision	
Stye	
Cauterization (Thermal)	
Conjuctival Resuturing	
Corneal Scarping	
I & D Lid Abscess	
Uncomplicated Lid Tear	
Indirect Opthalmoscopy	
Retinoscopy	

- Cataract surgery with IOL implantation is the most common surgery at District hospital
- ECCE +IOL is Most common followed by Phacoemulsification

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[PLEASE NOTE: After consultations with few Ophthalmologists at District level, in my opinion, Phacoemulsification at district level is much more common than other choices (though no written reference could be located on web or in library books/ journals)]

37. **Ans. (b) Pharmacist; (e) Laboratory technician** *[Ref. Park 23/e p906]*
38. **Ans. (d) 5000** *[Ref. Park 23/e p903]*
39. **Ans. (c) Conduct 50% delivery** *[Ref. Park 23/e p908-909]*
40. **Ans. (c) Provision of accident and emergency care** *[Ref. Park 23/e p905]*

OBJECTIVES OF IPHS FOR PHCS:

- Provision of comprehensive primary health care through PHCs
- Achievement and maintenance of an acceptable standard of quality of health care
- Making services more responsive and sensitive to the needs of community

41. **Ans. (d) Comprehensiveness** *[Ref. Park 23/e p891]*

COMPREHENSIVE HEATH CARE (BHORE COMMITTEE 1946):

- Preventive, curative and promotive health services from "Womb-to-tomb"
- Be as close to beneficiaries as possible
- Has widest cooperation between people, services and profession
- Is available to all irrespective of their ability to pay
- Look specifically after vulnerable and weaker sections of society
- Create and maintain a healthy environment both in home and working places

Review Questions

42. **Ans. (a) 1000** *[Ref. Park 23/e p902-903]*
43. **Ans. (a) 5,000** *[Ref. Park 23/e p903]*
44. **Ans. (a) 1 day** *[Ref. Park 23/e p109]*
45. **Ans. (c) 5000** *[Ref. Park 23/e p903]*
46. **Ans. (a) Zila Parishad** *[Ref. Park 23/e p881]*
47. **Ans. (c) 5000** *[Ref. Park 23/e p903]*
48. **Ans. (b) Sound referral center** *[Ref. Park 23/e p904-906]*
49. **Ans. (c) 1980** *[Ref. Park 23/e p902]*
50. **Ans. (c) Tertiary health care** *[Ref. Internet]*
51. **Ans. (c) 80 – 1.20,000** *[Ref. Park 23/e p907]*
52. **Ans. None (now its 1 per 1000)** *[Ref. Park 23/e p901]*
53. **Ans. (a) 20,000** *[Ref. Park 23/e p904-905]*
54. **Ans. (c) Community Health Center** *[Ref. Park 23/e p907]*
55. **Ans. (d) Supplementary functioning of under six children** *[Ref. Park 23/e p904-905]*
56. **Ans. (c) 20,000** *[Ref. Park 24/e p904-905]*
57. **Ans. (b) 20,000 & 3000 respectively** *[Ref. Park 23/e p904-905]*
58. **Ans. (d) Nyaya sabha** *[Ref. Park 23/e p881]*
59. **Ans. (c) Appropriate technology** *[Ref. Park 21/e p829, Park 22/e p833]*
60. **Ans. (d) Health assistant** *[Ref. Park 23/e p912-913]*
61. **Ans. (a) 1000** *[Ref. Park 23/e p902-903]*
62. **Ans. (a) Treatment is done by a docter** *[Ref. Park 23/e p902-904]*

HEALTH PLANNING

63. **Ans. (b) Goal** *[Ref. Park 23/e p869]*
    - *Goal*: Ultimate desired state towards which objectives and resources are directed
      - Is not constrained by time or existing resources
      - Is not necessarily attainable

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Also Remember

- *National Rural Health Mission (NRHM) was launched in*: 2005
- *Target years for important health related goals*:
  - National socio-demographic goals of *'National Population Policy 2000'* have to be achieved by 2010
  - Goals of *'National Health Policy 2002'* have to be achieved by 2015 (Few goal(s) each for 2005, 2007, 2010 and 2015)
  - 8 Millennium Development Goals (MDGs) have to achieved by 2015
    - 3 out of 8 goals, 8 out of 18 targets required to achieve them and 18 out of 48 indicators of progress are *'directly health related'*
    - Goal 4, 5 and 6 are *'directly health related'*
    - Goal 2 and 3 *'do not pertain to health'*
- *3 next diseases targeted for eradication globally*:
  - Poliomyelitis
  - Guinea worm/Dracunculiasis
  - Measles
    - *Disease next targeted for elimination from India*: Poliomyelitis

64. Ans. (a) To bring down total fertility rate (TFR) to replacement levels by 2015
[Ref. Park 23/e p493]

65. Ans. (d) Bhore Committee *[Ref. Park 23/e p873]*
- Bhore Committee (1946) gave along term plan known as "3-million Plan". It envisaged setting up 'Primary health units' with 75-bedded hospitals for each 10,000 – 20,000 population and 'Secondary health units' with 650-bedded hospitals, again regionalized around district hospitals with 2,500 beds

Also Remember

- Bhore Committee (1946), also known as *'Health Survey & Development Committee'* was appointed by Government of India, with Sir Joseph Bhore as chairman *'in 1943'*

66. Ans. (a) 100 per 100,000 live births *[Ref. Park 23/e p493]*
- Under the National Population Policy (NPP) 2000, it is aimed to reduce the maternal mortality ratio (MMR) to below 100 per 100,000 live births

67. Ans. (d) Eliminate Lymphatic Filariasis *[Ref. Park 23/e p873]*
- Under National Health Policy (NHP) – 2002, *'Lymphatic Filariasis has to be eliminated by 2015'*

Also Remember

- National socio-demographic goals of 'National Population Policy 2000' have to be achieved by 2010
- 'Millennium Development Goals' (MDGs) have to be achieved by 2015
- Previous National Health Policy, India was formulated in 1983

68. Ans. (d) Major changes in Medical education to prepare "Social Physicians" *[Ref. Park 23/e p873]*
- Bhore Committee (1946) recommended preparing *'Social physicians'* (3 months internship training in medical education of Preventive and Social Medicine)
- Constitution of All India Health Service on the pattern of IAS: Recommendation of *Mudaliar Committee* (*1962*)
- Separate staff for Family Planning Programme: Recommendation of *Mukerji Committee* (*1965*)
- Creation of "Bands of para-professionals & semi-professional health workers": Recommendation of *Srivastav Committee* (*1975*)

69. Ans. (c) Kartar Singh Committee *[Ref. Park 23/e p874]*
- Kartar Singh Committee was known as 'The Committee on Multi purpose Workers under Health and Family Planning'

70. Ans. (a) Achieve zero level growth of HIV/ AIDS – 2010 *[Ref. Park 23/e p873]*
- Under NHP 2002, zero level of growth of HIV had been targeted for 2007

71. Ans. (b) A-I, B-IV, C-III, D-II *[Ref. Park 23/e p873-875]*
- Bhore Committee: *Health Survey & Development Committee*
- Mudaliar Committee: *Health Survey & Planning Committee*

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- Jungalwallah Committee: *Committee on Integration of Health Services*
- Kartar Singh Committee: *Committee on MPWs under Health & Family Planning*

72. Ans. (c) Srivastave Committee: *[Ref. Park 23/e p875]*
- Srivastava Committee (1975) was set up as the '*Group on Medical Education & Support Manpower*'

73. Ans. (b) d c b a *[Ref. Park 23/e p869]*
- *Planning Cycle consists of following steps*:
  - *Pre-planning*: Government interest, Legislation, Organization for planning and Administrative capacity
  - *Step 1*: '*Analysis of health situation*'
  - *Step 2*: Establishment of goals and objectives
  - *Step 3*: Assessment of resources
  - *Step 4*: Fixing priorities
  - *Step 5*: Write-up of formulated plan
  - *Step 6*: Programming and implementation
  - *Step 7*: Monitoring
  - *Step 8*: Evaluation

74. Ans. (c) Expert Level Committee on Universal Health Coverage *[Ref. Universal Health Coverage in India, Planning Commission, Government of India, 2010]*

HLEG Recommendations
- High Level Expert Group (HLEG, Planning Commission, GOI) on Universal health Coverage has suggested 3½ year MBBS course for serving rural population
- HLEG was developed for XII Five Year Plan
- Rural doctors will be called as 'Community Health Officers'
- 3½ Degree given: B.Sc. Community Health

75. Ans. (d) All *[Ref. K. Park 23/e p869-870]*

76. Ans. (c) Kartar singh committee *[Ref. K. Park 23/e p874-875]*

77. Ans. (d) Procedure *[Ref. K. Park 23/e p868-809]*

78. Ans. (c) Recommends health manpower policy *[Ref. India Health Report 2010, p132]*

79. Ans. (b) Jungallwalla committee *[Ref. K. Park 23/e p873-875]*

80. Ans. (b) Manpower and planning *[Ref. India Health Report 2010, p132]*

81. Ans. (c) Shrivastava committee *[Ref. K. Park 23/e p875]*

82. Ans. (c) High level expert group *[Ref. Universal Health Coverage in India, Planning Commission, Government of India, 2010]*

83. Ans. (b) Article 21 *[Ref. Ideas of Being Indians and Making of Indians by Varugghese, 1/e]*

Review Questions

84. Ans. (c) Kartar Singh committee *[Ref. Park 23/e p873-875]*

85. Ans. (a) Nutritional supplements *[Ref. Park 23/e p876]*

86. Ans. (a) Bhore committee *[Ref. Park 23/e p873]*

87. Ans. (b) Bhore *[Ref. Park 23/e p873]*

88. Ans. (a) Increasing demands for resources *[Ref. Park 21/e p814, Park 22/e p818]*

89. Ans. (d) Kartar Singh committee *[Ref. Park 23/e p874-875]*

90. Ans. (c) Integration of PHCs *[Ref. Internet]*

91. Ans. (a) Bhore committee *[Ref. Seshu Bobu 2/e p435, Park 21/e p812, Park 22/e p816]*

92. Ans. (a) Shrivastav Committee *[Ref. Park 23/e p875]*

93. Ans. (c) Union health minister *[Ref. Park 23/e p879]*

94. Ans. (a) Bhore committee *[Ref. Park 23/e p873]*

95. Ans. (b) Kartar Singh Committee *[Ref. Park 23/e p874-875]*

96. Ans. (b) Planning, Object, Goal, Evaluation *[Ref. Park 23/e p869-870]*

97. Ans. (b) Concept of multipurpose worker *[Ref. Park 23/e p874]*

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HEALTH MANAGEMENT

98. Ans. (c) QALYs gained *[Ref. Textbook of Community Medicine by Sunder Lal, 2/e p56-57; Park 23/e p871]*

- *Cost Effectiveness Analysis* (*CEA*): Benefits are measured in natural units (e.g. Life years gained, heart attacks avoided)
  - *CEA is an expression of the desired effect* of a programme, service, institution or support activity in reducing a health problem
  - *CEA measures the degree of attainment of pre-determined objectives and targets*
  - *Most comprehensive indicator of CEA*: Quality adjusted life years (QALYs) gained
- *Cost Benefit Analysis* (*CBA*): Benefits are measured in monetary terms
  - Approaches for CBAL:

a. Human capital approach
b. Willingness to pay approach

99. Ans. (c) Network analysis *[Ref. Park 23/e p872]*

- *Network Analysis*: Is the graphic plan of all events and activities to be completed in order to reach an end objective. Two common types of network technique are:
  - *Programme Evaluation and Review Technique* (*PERT*): An arrow diagram representing the logical sequence in which events must take place. It aids in planning, scheduling and monitoring the project; allows better communication between various levels and helps furnish timely, updated progress reports
  - *Critical Path Method (CPM):* The *'longest path'* of the network is called as critical path. If any activity along the critical path is delayed, entire project will be delayed

100. Ans. (d) Efferent *[Ref. Internet; www.cliffnotes.com]*

POWER OF A MANAGER:

- A manager has two sources of *'Power'* (ability to influence or use the authority entrusted):
  - *Positional sources of power*:
    - *Reward*: A manager can reward (monetary, promotion) his subordinates
    - *Coercive* (Punishment): A manager can punish his subordinates
    - *Legal*: A manager has legal authority and power over subordinates
    - *Contractual*: A manager has power over subordinates by virtue of signed contract by his employees
  - *Personal sources of power*:
    - *Expertise*: A manager can assert greater power if he has expertise in his field of work
    - *Referrent*: A manager has greater power if he has good inter-personal relationships with his subordinates

101. Ans. (a) Cost effective analysis *[Ref. Park 23/e p871]*

- *Cost Effective Analysis*: A management technique where benefits are expressed in terms of results achieved, e.g., number of lives saved or number of days free from disease
  - It is a more promising tool than cost benefit analysis in the health field
- *Cost Benefit Analysis*: A management technique where economic benefits of any programme are compared with cost of that programme
  - The *'benefits are expressed in monetary terms'*
  - *Main drawback*: All benefits in field of heath cannot be expressed in monetary terms
- *Cost Accounting*: A quantitative management technique which provides basic data on cost structure of any programme
- *Input-Output Analysis*: An economic technique which enables calculations to be made of the effects of changing the inputs

102. Ans. (a) Cost benefit analysis *[Ref. Park 23/e p871]*

103. Ans. (a) Is a part of Input-Output analysis *[Ref. Park 23/e p871-872]*

104. Ans. (a) Cost-benefit analysis *[Ref. Park 23/e p871]*

105. Ans. (c) Ultimate desired state towards which objectives and resources are directed *[Ref. Park 23/e p868]*

106. Ans. (d) Total Quality management *[Ref. K. Park 23/e p871]*

107. Ans. (d) Work sampling *[Ref. K. Park 23/e p872]*

108. Ans. (a) Network analysis *[Ref. K. Park 23/e p872]*

109. Ans. (a) Relies on data of previous budget *[Ref. K. Park 22/e p815]*

110. Ans. (a) ABC *[Ref. Inventory management by DC Bose, 1/e p32]*

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111. **Ans. (d) Longest path in a network** *[Ref. Park 23/e p872]*

112. **Ans. (a) Cost effectiveness analysis** *[[Ref. Park 23/e p871]*

HEALTH MANAGEMENT TECHNIQUES/ METHODS:

Behavioural sciences methods	Quantitative methods
Organizational design	Cost benefit analysis
Personal management	Cost effective analysis
Communication	Cost accounting
Information system	Input-output analysis
Management by Objectives (MBO)	Model
	Systems analysis
	Network analysis (PERT/ CPM)
	Planning programming budget system
	Work sampling
	Decision making

Review Questions

113. **Ans. (b) Systems analysis** *[Ref. Park 21/e p810, Park 23/e p872]*

114. **Ans. (a) Network analysis** *[Ref. Park 21/e p811, Park 23/e p872]*

115. **Ans. (a) Network Analysis** *[Ref. Park 21/e p811, Park 23/e p872]*

116. **Ans. (b) System analysis** *[Ref. Park 23/e p872]*

117. **Ans. (b) Burning/breaking of bridges** *[Ref. Logical reasoning]*

118. **Ans. (b) Quantitative analysis** *[Ref. Park 23/e p872]*

119. **Ans. (c) Management** *[Ref. Park 23/e p872]*

120. **Ans. (a) Pharmacists are more than lab technician** *[Ref. Park 23/e p901]*

121. **Ans. (d) Work sampling** *[Ref. Park 23/e p872]*

122. **Ans. (a) Network analysis** *[Ref. Park 23/e p872]*

123. **Ans. (a) Cost-benefit analysis** *[Ref. Park 23/e p871]*

MISCELLANEOUS

124. **Ans. (b) Drug A is more cost-effective than drug B for treating children** *[Logical Reasoning]*

In the given question

Drug	Cost	Effectiveness	
		Children	Adults
Drug A	2X	95%	95%
Drug B	X	90%	47%

Also,

Dr. Sunil, a general practitioner, always uses drug B for the first treatment, and resorts to drug A if the infection persists WHEREAS,

Dr. Sudhir, another general practitioner, always uses drug A for adults and drug B for children

Therefore,

- Drug A is more effective than B for treating children (A - 95% versus B - 90%)

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- Drug A is more cost-effective than drug B for treating adults (A – 2X cost with 95% effectiveness versus B – X cost with 47% effectiveness)
- Dr. Sudhir's regime achieves a higher level of cost-effectiveness than Dr. Sunil's (Dr. Sudhir – A for adults and B for children versus Dr. Sunil – B for initial treatment and A if infection persists)

However, Drug B is more cost effective for treating children (B – Cost X with 90% effectiveness versus A – Cost 2x with 95% effectiveness i.e., marginal increase)

125. Ans. (b) 5.2% of G.D.P. *[Ref. World Health Report, 2000]*

- *According to the World Health report 2000, India's total health expenditure on health as % of GDP*: 5.2%

126. Ans. (c) 7.8 *[Ref. Internet]*

127. Ans. (c) Disability prevalence *[Ref. Park 23/e p27]*

- *Crucial factors for realization of goals of a National Health Policy*:
  - A political commitment
  - Financial implications
  - Administrative reforms
  - Community participation
  - Basic legislation

128. Ans. (a) Repeatability *[Ref. Park 21/e p820-21, Park 22/e p824, 825]*

- Components/elements of evaluation process in health services are:
  - *Relevance*: Appropriateness (need) of a health service
  - *Adequacy*: Sufficient attention to pre-determined course of action
  - *Accessibility*: Proportion of population expected to use the service
  - *Acceptability*: Socially and culturally acceptable
  - *Effectiveness*: Extent of prevention/alleviation of underlying problem
  - *Efficiency*: How well resources are utilized
  - *Impact*: Overall effect of programme/service on health and development

129. Ans. (d) Achieve a significant improvement in lives of 100 million slum dwellers
[Ref. National Health Programs of India by Dr. J. Kishore, 7/e p7; Park 23/e p893-895]

- All targets in MDGs have to be achieved by 2015
  - *Only one target in MDGs is to be achieved by 2020*: Achieve a significant improvement in lives of 100 million slum dwellers

Also Remember

MILLENNIUM DEVELOPMENT GOALS (MDGs):

- In September 2000, 189 countries adopted UN Millennium Declaration. Millennium Development Goals (MDGs) Goals place health at the heart of development and represent commitments by governments
- *Baseline Year for MDGs*: 1990
- *Deadline year for MDGs*: 2015
- *There are 8 MDGs*:
  Goal 1: Eradicate extreme poverty and hunger
  Goal 2: Universalise primary education
  Goal 3: Gender equality and women empowerment
  Goal 4: Reduce child mortality
  Goal 5: Improve maternal health
  Goal 6: Combat HIV/AIDS, malaria and other disease (Tuberculosis)
  Goal 7: Ensure environmental sustainability
  Goal 8: Develop global partnerships for development
- 3 out of 8 goals, 8 out of 18 targets required to achieve them and 18 out of 48 indicators of progress are *'directly health related'*
  - Goal 4, 5 and 6 are *'directly health related'*
  - Goal 2 and 3 'do not pertain to health'

130. Ans. (d) 604 *[Ref. Internet; www.districts.nic.in and Park 23/e p880, 614]*

- *Total no. of districts in India*: currently 672 districts in 2014

131. Ans. (b) 2015 *[Ref. Park 23/e p893-895]*

- National socio-demographic goals of *'National Population Policy 2000'* have to be achieved by 2010
- Goals of *'National Health Policy 2002'* have to be achieved by 2015 (Few goals each for 2005, 2007, 2010 and 2015)

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132. Ans. (b) Large hospitals *[Ref. Park 23/e p48]*

- Hospitals are known as *'Ivory Towers of Disease'*, as they exist in splendid isolation in the community, absorb vast proportion (50-80%) of the health budget, are not people-oriented, are inflexible in procedures and styles and treatment is expensive

133. Ans. (c) 3 *[Ref. K Park 23/e p893-895]*

134. Ans. (c) Two third *[Ref. K. Park 23/e p895]*

135. Ans. (a) 6 *[Ref. K. Park 23/e p895]*

136. Ans. (c) 0.75 *[Ref. Park 23/e p895]*

137. Ans. (b) UN in 2000 *[Ref. Park 23/e p893]*

MILLENNIUM DEVELOPMENT GOALS (MDGS):

- *Description:* In September 2000, 189 countries adopted UN Millennium Declaration
- Millennium Development Goals (MDGs) Goals place health at the heart of development and represent commitments by governments
- *Baseline Year for MDGs:* 1990
- *Deadline year for MDGs:* 2015

Review Questions

138. Ans. (d) Traditional birth attendant *[Ref. Park 21/e p839]*

139. Ans. (b) Gram Sevak *[Ref. Park 21/e p839-40]*

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CHAPTER

15 International Health

INTERNATIONAL HEALTH AGENCIES

World Health Organization (WHO)

- *Description:* WHO is a specialized, non-political health agency of United Nations
- *Constitution of WHO:*
  - Drafted by 'Technical Preparatory Committee' in 1946
  - Came into force on 7th April, 1948Q
- *Objective of WHO:* Is attainment by all people of the highest level of healthQ
- *First Constitutional function of WHO:* To act as the directing and co-coordinating authority on all International health workQ
- *Headquarters of WHO:* Geneva, SwitzerlandQ
- *Broad areas of work of WHO:*
  - Prevention and control of specific diseases
  - Development of comprehensive health services
  - Family health
  - Environmental health
  - Health statistics
  - Bio-medical research
  - Health literature and information
  - Cooperation with other organisations
- *Structure of WHOQ:*
  - *The World Health Assembly (WHA):* Is the 'Health Parliament' and supreme governing body of the organizationQ; Functions of WHA:
    - To determine International health policies and programmes
    - To review work of past year
    - To approve budget for the following year
    - To elect member states to designate persons for Executive Board
  - *The Executive Board*
  - *The Secretariat:* Is the 'Chief technical and administrative unit of WHO'Q
- *WHO has established 6 regional organizations:*

Region	Headquarters
Southeast AsiaQ	New Delhi, India
Africa	Brazaville, Congo
The Americas	Washington DC, USA
Europe	Copenhagen, Denmark
Eastern Mediterranean	Alexandria, Egypt
Western Pacific	Manila, Philippines

I Headquarters of WHO: Geneva, Switzerland

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World Health Day (WHD) Themes

Year	World Health Day (WHD) Theme
2004	Road safety is no accident
2005	Make every mother and child count
2006	Working together for health
2007	International health security: Invest in health, build a safer future
2008	Protecting health from climate change
2009	Health facilities in emergencies
2010	Urbanization and health (1000 cities – 1000 lives)
2011	Antimicrobial resistance
2012[Q]	Ageing and health
2013[Q]	High blood pressure
2014[Q]	Vector borne diseases
2015[Q]	Food Safety
2016	Diabetes

I 2013[Q] High blood pressure

Health Agencies Headquarters

Health agencies	Headquarters
WHO (World Health Organization) [Q]	Geneva, Switzerland
UNICEF (United Nations Children Fund) [Q]	New York, USA
UNDP (United Nations Development Programme)	New York, USA
FAO (Food and Agricultural Organization)	Rome, Italy
ILO (International Labour Organization)	Geneva, Switzerland

I UNICEF (United Nations Children Fund) New York, USA

UNICEF's GOBI-FFF Campaign[Q]

- *UNICEF is promoting 'GOBI Campaign' to encourage 4 strategies for a 'Child Health Revolution':*
  - **G:** Growth Charts (to better monitor child development)
  - **O:** Oral Rehydration (to treat mild and moderate dehydration)
  - **B:** Breast Feeding
  - **I:** Immunization (against TB, Polio, Diphtheria, Pertussis, Tetanus and Measles)
- *'Three F's' have now been incorporated in 'UNICEF's GOBI-FFF Campaign':*
  - **F:** Female Education
  - **F:** Family Spacing
  - **F:** Food Supplements

MISCELLANEOUS

Diseases under International Surveillance (WHO)[Q]

- Louse borne typhus fever
- Relapsing fever
- Poliomyelitis
- Malaria
- Human Influenza
- Rabies
- Salmonellosis

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Tropical Diseases Targeted for Research and Training (WHO)[Q]

- Trypanosomiasis
- Filariasis
- Schistosomiasis
- Leishmaniasis
- Malaria
- Leprosy

Diseases under International Health Regulations (IHRs)[Q]

- Cholera
- Plague
- Yellow Fever
- Wild Poliomyelitis
- Human Influenza
- SARS
- Smallpox

List of Quarantinable Diseases (CDC)[Q]

- Diphtheria
- Plague
- Yellow Fever
- Smallpox
- Infectious TB
- Viral Hemorrhagic Fevers
- Severe Acute Respiratory Syndrome (SARS)

Bio Terrorism Agents

Category A[Q]	Category B	Category C[Q]
Can be easily disseminated	*Moderately easy to disseminate*	*Emerging pathogens*
High mortality rates	*Moderate morbility + low mortality*	*Available*
Public panic & disruption	*Require enhanced diagnostic capacity*	*Ease of production*
	Require enhanced surveillance	High morbility and mortality
Botulism **T**ularaemia **A**nthrax **S**mall pox **P**lague **V**iral hemorrhagic fevers [**Mnemonic: Bio** **T**errorism **A**gents include **S**mall **P**ox **V**irus]	Brucellosis Clostridium perfirengens Food safety threats Water safety threats Glanders Meliodoses Psittacosis Q fever Ricin toxin Staphylococcal enterotoxin B Epidemic typhus Viral encephalitis	Nipah virus Hanta virus

List of Few Nobel Laureates in Physiology or Medicine

- *Sir Ronald Ross:* Life cycle of Plasmodium[Q]
- *I.P. Pavlov:* Physiology of digestion
- *Robert Koch:* Discoveries in Tuberculosis[Q]

I

Sir Ronald Ross: Life cycle of Plasmodium
F.G. Banting & J.J.R. McLeod: Insulin
Paul H. Muller: DDT
Har Gobind Khorana: Interpretation of genetic code

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- *Paul Ehrlich:* Immunity
- *F.G. Banting & J.J.R. McLeod:* Insulin[Q]
- *Willem Einthoven:* ECG[Q]
- *Karl Landsteiner:* Human blood groups[Q]
- *Sir Alexander Fleming:* Penicillin[Q]
- *Paul H. Muller:* DDT[Q]
- *S.A. Waksman:* Streptomycin (First antibiotic, against TB)[Q]
- *Har Gobind Khorana:* Interpretation of genetic code[Q]
- *Sir Godfrey N. Hounsfield:* CT scan[Q]
- *J.E. Murray & E.D. Thomas:* Organ and cell transplantation
- *Sir Peter Mansfield:* MRI[Q]
- *B.J. Marshall & J.R. Warren:* H. pylori; its role in peptic ulcer disease
- *H.Z. Hausen:* HPV causing cervical cancer
- *F.B. Sinnoussi & L. Montagnair:* HIV
- *Robert G. Edwards:* In-vitro fertilization

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MULTIPLE CHOICE QUESTIONS

INTERNATIONAL HEALTH AGENCIES

1. **Which of the following statements is incorrect about WHO?** *[AIPGME 1999]*
   (a) Objective of WHO is attainment by all people of the highest level of health
   (b) Headquarters of WHO are located in Geneva
   (c) WHO is a non-specialized, political agency of United Nations
   (d) World Health Assembly is the 'Health Parliament' and supreme governing body of the organization

2. **Match the following health agencies and the location of their headquarters:**
   Health agency Headquarters
   A. WHO I – Rome, Italy
   B. UNICEF–II – New York, USA
   C. FAOIII – Geneva, Switzerland
   (a) A – I, B – II, C – III *[AIIMS Nov 1999]*
   (b) A – III, B – II, C – I
   (c) A – III, B – I, C – II
   (d) A – I, B – III, C – II

3. **WHO was established in:** *[AIIMS Dec 95]*
   (a) 1945
   (b) 1948
   (c) 1950
   (d) 1956

4. **International Red Cross is based in:** *[AIIMS Dec 97]*
   (a) Geneva
   (b) New York
   (c) New Delhi
   (d) Rome

5. **In UNICEF's GOBI Campaign, 'O' stands for:**
   (a) Oral Contraceptives *[DPG 2006]*
   (b) Oral Rehydration Therapy
   (c) Obesity
   (d) Occupational hazards

6. **Members of southeast Asia of WHO are:**
   (a) Japan *[PGI June 01]*
   (b) Afghanistan
   (c) India
   (d) Pakistan
   (e) Sri Lanka

7. **Highest funding for reproductive health is by:**
   (a) UNFPA *[Recent Question 2013]*
   (b) UNICEF
   (c) ILO
   (d) WHO

8. **WHO formation day is:** *[Recent Question 2013]*
   (a) 5 May
   (b) 7 April
   (c) 10 June
   (d) 10 July

9. **Which of the following international health agencies promoted a GOBI campaign?** *[PGMCET 2015]*
   (a) USAID
   (b) UNICEF
   (c) UNDP
   (d) UNFPA

10. **Surveillance Reporting System used by WHO is** *[Recent Question 2015]*
    (a) Technical Report Series
    (b) Weekly Epidemiological Report
    (c) Morbidity and Mortality Weekly Report
    (d) WHO Bulletin

Review Questions

11. **UNICEF provides all *except*:** *[UP 2000]*
    (a) Child nutrition
    (b) Child health education
    (c) Immunization
    (d) Family planning

12. **World bank gives loans for:** *[UP 2005]*
    (a) For economic growth
    (b) Cobalt therapy of radiotherapy department
    (c) Purchase of microscope for tuberculosis investigation
    (d) To change of the social justice

13. **All of the following activities of Junior Red Cross *except*:** *[UP 2007]*
    (a) Military hospital worker
    (b) Village uplift
    (c) Prevent epidemic work
    (d) Any of the above

14. **Headquarters of UNICEF is at:** *[MH 2000]*
    (a) Geneva
    (b) New York
    (c) Rome
    (d) New Delhi

15. **UNDP works as:** *[MH 2006, MH 2006]*
    (a) The main source of funds for technical assistance
    (b) The main source of funds for child health
    (c) The Source of funds for research and development
    (d) Education source for developing countries

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16. **All of the following organization have their head quarter at Geneva *except*:** *[MH 2006]*
(a) UNICEF
(b) WHO
(c) ILO
(d) None

17. **All of the following organizations have their head quarter at Geneva *except*:** *[MH 2006] [(MH 2008]*
(a) UNICEF
(b) WHO
(c) ILO
(d) International red cross

18. **Head quarter of WHO is at:** *[RJ 2000]*
(a) New York
(b) Geneva
(c) London
(d) New Delhi

19. **All disease are included in internationally notifiable disease except:** *[RJ 2004]*
(a) Plague
(b) Cholera
(c) Yellow fever
(d) TB

MISCELLANEOUS

20. **Diseases under International Surveillance includes all except:** *[AIPGME 1991,1992]*
(a) Louse borne typhus fever *[AIIMS May 1991]*
(b) Relapsing fever *[Recent Question 2013]*
(c) Paralytic polio
(d) Yellow fever

21. **Tropical diseases targeted for research and training by WHO include all *except*:** *[JIPMER 2008]*
(a) Trypanosomiasis
(b) Filariasis
(c) Schistosomiasis
(d) Onchocerciasis

22. **Finger Print Bureau was first established in:**
(a) England *[AIPGME 06]*
(b) China
(c) India
(d) Singapore

23. **Emporiatrics refers to study of:** *[AIIMS May 95]*
(a) Occupational disease
(b) Air pollution
(c) Environmental factor
(d) Health of travelers

24. **Quarantine was originally introduced as a protection against:** *[AIIMS June 1997]*
(a) Plague
(b) Tuberculosis
(c) AIDS
(d) Malaria

25. **Disease excluded and re-included from International Health Regulations till date is:**
(a) Small pox *[AIPGME 2006]*
(b) Guinea worm
(c) Typhoid
(d) HIV/AIDS

26. **World Health Day is observed every year on:**
(a) January 11 *[AIIMS Dec 92]*
(b) April 7 *[Recent Question 2013]*
(c) June 5
(d) December 1

27. **Only certificate of vaccination required for international travel is:** *[Karnataka 2009]*
(a) Hepatitis B
(b) BCG
(c) Tetanus
(d) Yellow fever

28. **Contribution of Germany to pubic health:**
(a) Germ theory *[PGI June 05]*
(b) Pasteurization
(c) Quarantine ship
(d) Social medicine
(e) Compulsory sickness benefit

29. **All of the following are most important and potential agents which can be used for Bio-terrorism *except*:**
(a) Smallpox *[AIIMS Dec 97]*
(b) Plague
(c) Botulism
(d) Tuberculosis

30. **Which of the following is not true about World Health Report 2008?** *[AIPGME 2011]*
(a) Service delivery reforms
(b) Leadership reforms
(c) Public Policy reforms
(d) Economic reforms

31. **For studying the complete amino acid sequence of two polypeptide chains of Insulin, Nobel Prize was awarded to:** *[AIIMS November 2011]*
(a) Fredreich Sanger
(b) Banting and Macleod
(c) Paul Muller
(d) Alexander Fleming

32. **Who among the following has/have received Nobel Prize?** *[PGI November 2012]*
(a) Louis Pasteur
(b) Taum and Lederberg
(c) Ronald Ross
(d) Kary Mullis
(e) Leeuwenhoek

33. **Bioterrorism group-A agent is?**
(a) Q fever *[Recent Question 2012, 2013]*
(b) Typhus fever
(c) Anthrax
(d) Brucellosis

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34. **Maximum damage to Napoleon's army during his march to Moscow was done by:** *[DNB June 2010]*
(a) Typhus
(b) Plague
(c) Diarrhea
(d) Typhoid

35. **Emporiatrics deals with the health of:** *[DNB 2008]*
(a) Farmers
(b) Travellers
(c) Industrial workers
(d) Mine workers

36. **World anti-tobacco day is celebrated on:**
(a) 31st may *[Recent Question 2012]*
(b) 5th June
(c) 12th July
(d) 24th November

37. **According to International Health regulation (IHR) Act, a pregnant woman, with the following duration of pregnancy (in weeks), can't travel by air to other country:** *[DNB 2007]*
(a) 20
(b) 28
(c) 32
(d) 36

38. **Patient of which disease need not be quarantined?** *[Recent Question 2015]*
(a) Avian flu
(b) Ebola virus disease
(c) Infectious TB
(d) Tetanus

Review Questions

39. **Yellow fever vaccination starts protection after how many days of injection:** *[DNB 2006]*
(a) 5 days
(b) 10 days
(c) 15 days
(d) 20 days

40. **Rabies free country is:** *[DNB 2006]*
(a) China
(b) Russia
(c) Australia
(d) France

41. **According to international Health Regulation (IHR) Act, a pregnant woman, with the following duration of pregnancy (in weeks), cannot travel by air to other country?** *[DNB 2007]*
(a) 20
(b) 28
(c) 32
(d) 36

42. **Emporiatrics deals with the health of ?**
(a) Farmers *[DNB 2008]*
(b) Travellers
(c) Industrial workers
(d) Mine workers

43. **Study of disease in a traveller from one part to another:**
(a) Eugenics *[UP 2003]*
(b) Ergonomics
(c) Emporiatrics
(d) None

44. **International Notification is must in the following *except*:** *[TN 2003]*
(a) Cholera
(b) Plague
(c) Yellow fever
(d) Paralytic polio

45. **Certificate for vaccination during international travel is required in case of:** *[MP 2003]*
(a) Japanese Encephalitis
(b) Yellow fever
(c) Cholera
(d) Yellow severe and Cholera

46. **Quarantine is required for:** *[MP 2003]*
(a) Yellow fever
(b) Cholera
(c) Plague
(d) All the above

47. **World Health Day of WHO is on:** *[RJ 2000]*
(a) 7 April
(b) 10 April
(c) 11 April
(d) 15 April

48. **AIDS day is on:** *[RJ 2005]*
(a) 7 may
(b) 1 December
(c) 20 November
(d) None

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EXPLANATIONS

INTERNATIONAL HEALTH AGENCIES

1. **Ans. (c) WHO is a non-specialized, political agency of United Nations** *[Ref. Park 23/e p919-922]*

WORLD HEALTH ORGANIZATION (WHO):

- WHO is a specialized, non-political health agency of United Nations
- *Constitution of WHO*:
  - Drafted by 'Technical Preparatory Committee' in 1946
  - Came into force on 7th April, 1948
- *Objective of WHO*: Is attainment by all people of the highest level of health
- *First Constitutional function of WHO*: To act as the directing and co-coordinating authority on all International health work
- *Headquarters of WHO*: Geneva, Switzerland
- *Structure of WHO*:
  - *The World Health Assembly* (*WHA*): Is the 'Health Parliament' and supreme governing body of the organization; Functions of WHA:
    - To determine International health policies and programmes
    - To review work of past year
    - To approve budget for the following year
    - To elect member states to designate persons for Executive Board
  - *The Executive Board*
  - *The Secretariat*: Is the *'Chief technical and administrative unit of WHO'*
- *WHO has established 6 regional organizations*:

Region	Headquarters
Southeast Asia	New Delhi, India
Africa	Brazaville, Congo
The Americas	Washington DC, USA
Europe	Copenhagen, Denmark
Eastern Mediterranean	Alexandria, Egypt
Western Pacific	Manila, Philippines

Also Remember

- *WHO is unique among UN specialized agencies*: It has its own constitution, own governing bodies, own membership and own budget
- *7th April every year is celebrated every year as World Health Day* (*WHD*):
  - *WHD Theme 2016:* Diabetes.

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2. **Ans. (*b*) A – III, B – II, C – I** *[Ref. Park 23/e p921-923]*
   - *Health agencies and the location of their headquarters*:

Health agencies	Headquarters
IRC (International Red Cross)	Geneva, switxzerland
WHO (*World Health Organization*)	Geneva, Switzerland
UNICEF (*United Nations Children Fund*)	New York, USA
UNDP (*United Nations Development Programme*)	New York, USA
FAO (*Food and Agricultural Organization*)	Rome, Italy
ILO (*International Labour Organization*)	Geneva, Switzerland

3. **Ans. (*b*) 1948** *[Ref. Park 23/e p919]*
   - WHO has its origin in April 1945, whereas formal existence began on 7th April 1948

4. **Ans. (*a*) Geneva** *[Ref. Park 23/e p923]*
   - International Red Cross was founded by *'Henry Dunant'*
   - *Head quarters: Geneva, switzerland*

5. **Ans. (*b*) Oral Rehydration Therapy** *[Ref. Park 23/e p 922-923]*
   - UNICEF is promoting *'GOBI Campaign'* to encourage 4 strategies for a *'Child Health Revolution'*:
     - **G:** Growth Charts (to better monitor child development)
     - **O:** Oral Rehydration (to treat mild and moderate dehydration)
     - **B:** Breast Feeding
     - **I:** Immunization (against TB, Polio, Diphtheria, Pertussis, Tetanus and Measles)

Also Remember

- In addition, recent research in the developing world has highlighted three kinds of support for women. These changes 'the three F's' have now been incorporated in '*UNICEF's GOBI-FFF Campaign*':
  - **F:** Female Education
  - **F:** Family Spacing
  - **F:** Food Supplements

6. **Ans. (c) India; (e) Sri Lanka** *[Ref. Park 23/e p 921-922]*
   - *Members of WHO South East Asian Region (WHO SEARO)*:
     - Bangladesh
     - Bhutan
     - India
     - Indonesia
     - Korea
     - Maldives Islands
     - Myanmar
     - Nepal
     - Sri Lanka
     - Thailand

Also Remember

- Members of SAARC Region:
  - Afghanistan
  - Bangladesh
  - Bhutan
  - India
  - Maldives Islands
  - Nepal
  - Pakistan
  - Sri Lanka

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7. **Ans. (a) UNFPA** *[Ref. K. Park 23/e p923]*
8. **Ans. (b) 7 April** *[Ref. K. Park 23/e p919]*
9. **Ans. (b) UNICEF** *[Ref. Park 23/e p922]*
10. **Ans. (b) Weekly Epidemiological Report** *[Ref. Park 23/e p920]*
    - WHO routinely collects and disseminated Communicable disease International surveillance information through:
      - ATRS (Automated Telex Reply Service)
      - WER (Weekly Epidemiological Record)

Also Remember

- *WHO Technical Report Series (TRS)*: Publishes views and recommendations of WHO Expert Committee on Biological Standardization and Provide updated information on the establishment, discontinuation and replacement of the WHO International Biological Reference Preparations as well on the adoption of Guidelines and Recommendation
- *WHO Bulletin*: A monthly public health journal published by WHO which aims to give public health policy and practice guidance based on the best evidence available, while encouraging closer links between scientific investigation and the art of helping populations to lead healthier lives
- *Morbidity and Mortality Weekly Report (MMWR) series is prepared by the Centers for Disease Control and Prevention (CDC)*: Agency's primary vehicle for scientific publication of timely, reliable, authoritative, accurate, objective, and useful public health information and recommendations

Review Questions

11. **Ans. (d) Family planning** *[Ref. Park 23/e p 922-923]*
12. **Ans. (a) For economic growth** *[Ref. Park 23/e p 923]*
13. **Ans. (a) Military hospital worker** *[Ref. Park 23/e p925]*
14. **Ans. (b) New York** *[Ref. Park 23/e p922]*
15. **Ans. (a) The main source of funds for technical assistance** *[Ref. Park 23/e p923]*
16. **Ans. (a) UNICEF** *[Ref. Park 23/e p922-923]*
17. **Ans. (a) UNICEF** *[Ref. Park 23/e p922-923]*
18. **Ans. (b) Geneva** *[Ref. Park 23/e p921]*
19. **Ans. (d) TB** *[Ref. Park 23/e p841]*

MISCELLANEOUS

20. **Ans. (*d*) Yellow fever** *[Ref. Park 23/e p841]*
    - *Diseases under International Surveillance* (*WHO*):
      - Louse borne typhus fever
      - Relapsing fever
      - Poliomyelitis
      - Malaria
      - Human Influenza
      - Rabies
      - Salmonellosis

Also Remember

- Most of the '*national health programmes in India rely on Passive Surveillance*' for morbidity and mortality data collection
- Active Surveillance in National Health Programmes of India is done in:
  - NVBDCP (Health worker goes house to house every fortnight to detect fever cases, collect blood slides and provide presumptive treatment under malaria component)
  - National Leprosy Elimination Programme (Modified Leprosy Elimination Campaigns)

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- Sentinel Surveillance in National Health Programmes of India is done in National AIDS Control Programme (STD Clinics, ANC Clinics have been identified as sentinel sites to monitor trends of HIV/AIDS)
- *Monitoring versus Surveillance*:

MONITORING	SURVEILLANCE
Performance and analysis of routine measurements to detecting changes in environment or health status of a population	Continuous scrutiny of the factors that determine the occurrence and distribution of disease and other conditions of ill-health
One Time linear activity No feedback present No inbuilt action component present Stops once disease is eliminated/eradicated Smaller concept	*Continuous Cycle* Feedback present *'Inbuilt action component'* present Continues even after disease is eliminated/eradicated Broader concept

21. Ans. (*d*) Onchocerciasis *[Ref. Park 20/e p818, Park 21/e p854]*

• **Tropical diseases targeted for research and training by WHO:**	• **Diseases under International Health**
– Trypanosomiasis	*Regulations* (*IHRs*):
– Filariasis	– Cholera
– Schistosomiasis	– Plague
– Leishmaniasis	– Yellow Fever
– Malaria	– Wild Poliomyelitis
– Leprosy	– Human Influenza
–	– SARS
	– Smallpox
• **Diseases under International Surveillance (WHO):**	• **Current *'List of Quarantinable Diseases'* (CDC):**
– Louse borne typhus fever	– Diphtheria
– Relapsing fever	– Plague
– Poliomyelitis	– Yellow Fever
– Malaria	– Smallpox
– Human Influenza	– Infectious TB
– Rabies	– Viral Hemorrhagic Fevers
– Salmonellosis	– Severe Acute Respiratory Syndrome (SARS)

22. Ans. (*c*) India *[Ref. Internet]*

- *Fingerprint*: Is an impression of the friction ridges of all part of the finger
- *World's first Fingerprint Bureau*: opened in Calcutta (Kolkata), India in 1897 after the Council of the Governor General approved a committee report that fingerprints should be used for classification of criminal records
  - *Sir Williams James Herschel* initiated fingerprinting in India
- *Dermatoglyphics*: Is the scientific study of human fingerprints
- *Some firsts in Public Health*:
  - *First country to introduce Socialized medicine*: Russia
  - *First country to introduce Compulsory Sickness Insurance*: Germany
  - *First country to introduce Family Planning programme*: India
  - *First country to introduce Blindness Control programme*: India
  - *First country to introduce Fingerprint Bureau*: India

23. Ans. (*d*) Health of travelers *[Ref: A Dictionary of Public Health by Dr Jugal Kishore, 2002; p165, Park 23/e p126]*

- Travel medicine or *'Emporiatrics'* is the branch of medicine that deals with the prevention and management of health problems of international travelers

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Also remember

- *Nosology:* Branch of medicine dealing with classification of diseases

24. Ans. (*a*) Plague *[Ref. K. Park 23/e p120]*
- In 14th century '*quarantine*' was introduced in Europe to protect against importation of Plague
- Ships, crews, travelers were detained for a '*40 day period*'

25. Ans. (*a*) Small pox *[Ref. World Health Organisation]*
- The '*International Health Regulations*' (IHR, 2005) are an international law which helps countries working together to save lives and livelihoods caused by the international spread of diseases and other health risks
- The IHR (1969) were primarily intended to monitor and control six serious infectious diseases: cholera, plague, yellow fever, smallpox, relapsing fever and typhus
- Under the IHR (1969), '*only cholera, plague and yellow fever remain notifiable*', meaning that States are required to notify WHO if and when these diseases occur on their territory

Also Remember

- The IHR (2005) broaden the scope of the 1969 Regulations to cover existing, new and re-emerging diseases, including emergencies caused by non-infectious disease agents
- Under the IHR (2005), all cases of the following four diseases must also be automatically notified to WHO:
  - Smallpox
  - Poliomyelitis due to wild-type poliovirus
  - SARS
  - Human influenza

26. Ans. (*b*) April 7 *[Ref. Park 23/e p919]*

27. Ans. (d) Yellow fever *[Ref. Park 23/e p282-284]*

28. Ans. (e) Compulsory sickness insurance *[Ref. Internet, Park 21/e p9]*
- *Germ theory:* France (Louis Pasteur)
- *Pasteurisation:* France (Louis Pasteur)
- *Quarantine:* Croatia
- *Socialised medicine:* Russia
- *Compulsory sickness insurance:* Germany

29. Ans. (d) Tuberculosis *[Ref. CDC Atlanta Website; http://emergency.cdc.gov/agent/agentlist-category.asp]*
- Categories of bio-terrorism agents:

Category A	Category B	Category C
Can be easily disseminated	*Moderately easy to disseminate*	*Emerging pathogens*
High mortality rates	*Moderate morbidity + low mortality*	*Available*
Public panic and disruption	*Require enhanced diagnostic capacity*	*Ease of production*
	Require enhanced surveillance	*High morbidity and mortality*
Botulism	Brucellosis	Nipah virus
Tularaemia	Clostridium perfirengens	Hanta virus
Anthrax	Food safety threats	
Smallpox	Water safety threats	
Plague	Glanders	
Viral hemorrhagic fevers	Meliodoses	
[**Mnemonic:**	Psittacosis	
Bio **T**errorism **A**gents	Q fever	
include **S**mall **P**ox **V**irus]	Ricin toxin	
	Staphylococcal enterotoxin B	
	Epidemic typhus	
	Viral encephalitis	

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30. **Ans. (d) Economic reforms** *[Ref. World Health Report 2008, WHO, Pg XVI]*
    - *World Health Report 2008* ("Primary Health Care – Now More Than Ever") structures Primary health care reforms into 4 sets: **[Mnemonic: PLUS]**
      - **P**ublic policy reforms (promote and protect community health)
      - **L**eadership reforms (reliable health authorities)
      - **U**niversal coverage reforms (health equity)
      - **S**ervice delivery reforms (people-centred, health systems)
    - *World Health Report 2010* ("Health Systems Financing – The Path To Universal Coverage") recommends 4 strategies: **[Mnemonic: BIRD]**
      - **B**udgets (Governmental) reprioritization
      - **I**nnovative financing
      - **R**evenue collection efficiency increase
      - **D**evelopment assistance

31. **Ans. (a) Fredreich Sanger** *[Ref. Wikepedia]*

    LIST OF FEW NOBEL LAUREATES IN PHYSIOLOGY OR MEDICINE
    - *Sir Ronald Ross*: Life cycle of Plasmodium
    - *I.P. Pavlov*: Physiology of digestion
    - *Robert Koch*: Discoveries in Tuberculosis
    - *Paul Ehrlich*: Immunity
    - *F.G. Banting & J.J.R. McLeod*: Insulin
    - *Willem Einthoven*: ECG
    - *Karl Landsteiner*: Human blood groups
    - *Sir Alexander Fleming*: Penicillin
    - *Paul H. Muller*: DDT
    - *S.A. Waksman*: Streptomycin (First antibiotic, against TB)
    - *Har Gobind Khorana*: Interpretation of genetic code
    - *Sir Godfrey N. Hounsfield*: CT scan
    - *J.E. Murray & E.D. Thomas*: Organ and cell transplantation
    - *Sir Peter Mansfield*: MRI
    - *B.J. Marshall & J.R. Warren*: H. pylori; its role in peptic ulcer disease
    - *H.Z. Hausen*: HPV causing cervical cancer
    - *F.B. Sinnoussi & L. Montagnair*: HIV
    - *Robert G. Edwards*: In-vitro fertilization

32. **Ans. (b) Taum and Lederberg; (c) Ronald Ross; (d) Kary Mullis** *[Ref. Multiple sources]*
33. **Ans. (c) Anthrax** *[Ref. Bioterrorism Preparedness by N Khardori, 1/e p12]*
34. **Ans. (a) Typhus** *[Ref. Contagion and Chaos by AT PriceSmith, 1/e p166]*
35. **Ans. (b) Travellers** *[Ref. Infectious Disease Secrets, 1/e p394]*
36. **Ans. (a) 31st may** *[Ref. Complete Guide for SSC, 2011, p111]*
37. **Ans. (d) 36** *[Ref. International Health Regulations, WHO 2011]*
38. **Ans. (d) Tetanus** *[Ref. CDC, Atlanta website]*
    - *Quarantinable diseases*: Cholera, Diphtheria, Infectious Tuberculosis, Plague, Smallpox, Yellow Fever, Viral Haemorrhagic Fevers (Lassa, Marburg, Ebola, Crimean-Congo, South American, and others not yet isolated or named), Severe Acute Respiratory Syndrome (SARS 2003), Novel/Re-emergent influenza viruses (2005 Latest addition)

Review Questions

39. **Ans. (b) 10 days** *[Ref: Park 23/e p282-284]*
40. **Ans. (c) Australia** *[Ref: Park 23/e p276]*

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41. **Ans. (d) 36** *[Ref: Internet]*
42. **Ans. (b) Travellers** *[Ref: Park 23/e p126]*
43. **Ans. (c) Emporiatrics** *[Ref: Park 21/e p126]*
44. **Ans. NONE** *[Ref: Park 23/e p841]*
45. **Ans. (b) Yellow fever** *[Ref: Park 23/e p282-284]*
46. **Ans. (d) All the above** *[Ref: Park 23/e p120]*
47. **Ans. (a) 7 April** *[Ref: Park 23/e p919]*
48. **Ans. (b) 1 December** *[Ref: Internet]*

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CHAPTER

16

Biostatistics

DATA, VARIABLES AND SCALES

Data Presentation

Quantitative data[Q]	Qualitative data[Q]
Histogram[Q] Frequency polygon Frequency curve Line chart/graph Cumulative frequency diagram (Ogive) Scatter/Dot diagram[Q]	Bar diagram[Q] Pie/Sector diagram Pictogram/Picture diagram Map diagram/Spot map

STATISTICAL DATA GRAPHS

- **Histogram**
  - Is graphical presentation for 'continuous quantitative data'[Q]
  - Continuous groups are marked on x-axis (abscissa) while frequencies are marked on y-axis (ordinate).

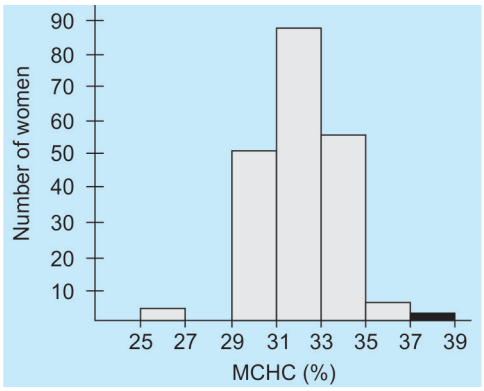

Figure: Histogram

I Histogram
Is graphical presentation for 'continuous quantitative data

- **Frequency Polygon**
  - Is an area diagram of frequency distribution developed over a histogram: Made by joining mid-points of class intervals at the heights of frequencies[Q]

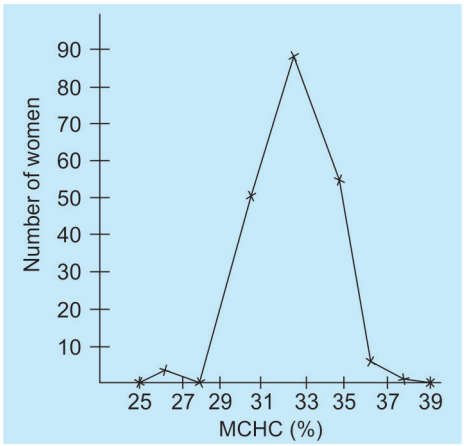

Figure: Frequency polygon

I Frequency Polygon
Made by joining mid-points of class intervals at the heights of frequencies[Q]

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- **Frequency Curve**
  - When no. of observations is large and group-interval is reduced: Frequency polygon loses its angulations to become a curve[Q].

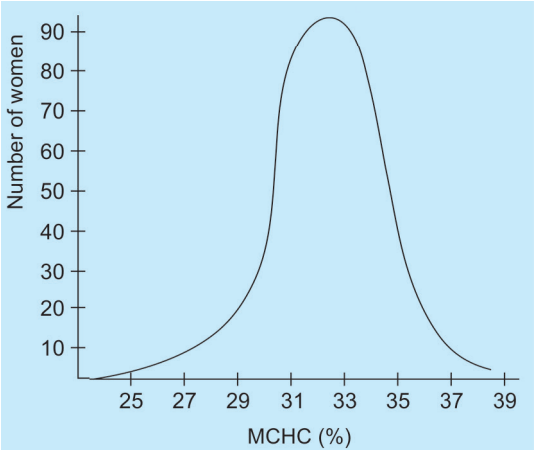

Figure: Frequency curve

- **Line Chart/Graph**
  - Is a frequency polygon presenting variations by line
  - It shows the trend of an event over a period of time[Q].

I Line Chart/Graph: It shows the trend of an event over a period of timeQ.

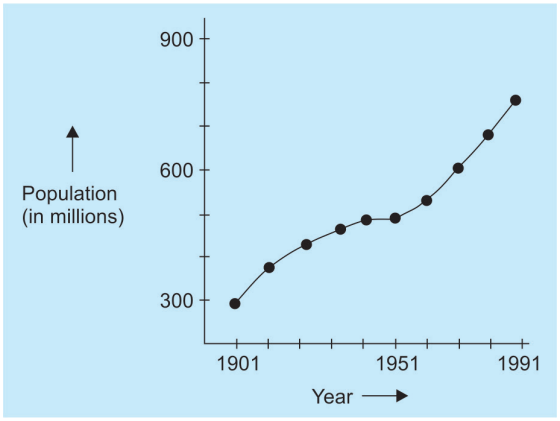

Figure: Line chart

- **Cumulative Frequency Diagram (Ogive)**
  - Is graph of cumulative relative frequency distribution[Q].

I (Ogive) cumulative relative frequency distributionQ.

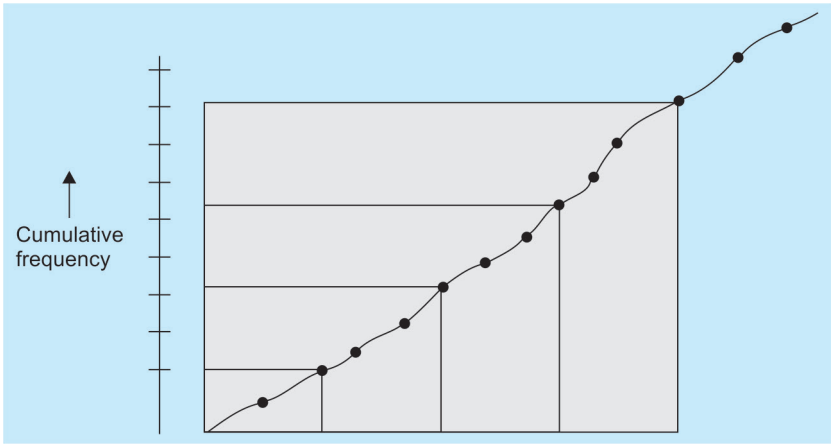

Figure: OGIVE (Cumulative frequency diagram)

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- **Scatter/Dot Diagram**
  - Also known as 'Correlation diagram'Q
  - Is used to depict 'correlation (relationship) between 2 quantitative variables'Q
  - Vertical axis in scatter diagram: should be the dependent or the outcome variable
  - In a scatter diagram, 2 imaginary lines are drawn along the distribution of dots/ scatter.

I Scatter/Dot Diagram: Is used to depict 'correlation

Figure: Scatter/dot diagram

- **Bar Diagram**
  - Is for visual comparison of magnitude of different frequencies in discrete data
  - Is'the most versatile of all statistical diagrams'Q
  - Bar diagram is of 3 types:
    - * Simple bar diagram
    - * Multiple bar diagram
    - * Proportional bar diagram.

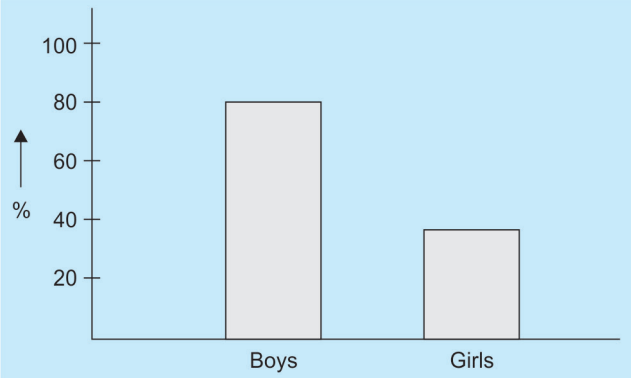

Figure: Bar diagram

- **Pie/Sector Diagram**
  - Is for 'presentation of discrete data of qualitative characteristics'Q
  - All pie categories are mutually exclusive, with a total of 100% (360°)Q.

I Pie/Sector Diagram: All pie categories are mutually exclusive, with a total of 100%

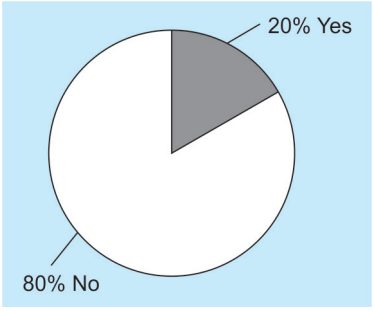

Figure: Pie (Sector) diagram

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- **Pictogram/Picture Diagram**
  - Is a method to impress the frequency of occurrence of events to common man[Q]

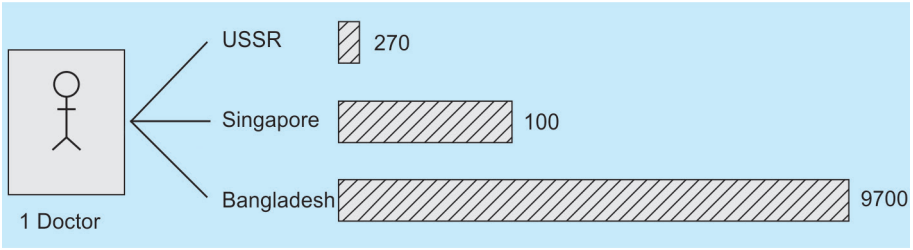

Figure: Pictogram (Population per doctor)

- **Map diagram/Spot Map**
  - Is prepared to show geographical distribution of frequencies of characteristic[Q]
  - Each spot (dot) marks one frequency.

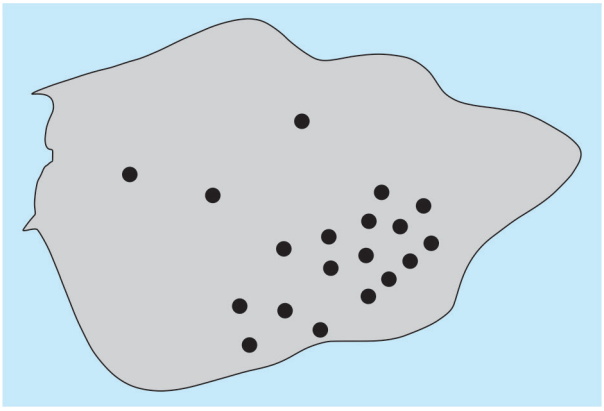

Figure: Spot map

Scatter Diagram

Also known as '*Correlation diagram*' or '*Dot diagram*'[Q]

- Is used to depict '*correlation (relationship) between 2 quantitative variables*'[Q]
- Vertical axis in scatter diagram: should be the dependent or the outcome variable
- In a scatter diagram, 2 imaginary lines are drawn along the distribution of dots/ scatter
- *Types of correlation:*

Types of correlation	Scatter diagram[Q]	Correlation coefficient[Q]	Interpretation[Q]
Perfectly positive correlation	Both lines have a positive slope (at 45° each); superimposed	r = +1	Rise in one variable leads to proportionate rise in other
Perfectly negative correlation	Both lines have a negative slope (at 45° each); superimposed	r = –1	Rise in one variable leads to proportionate fall in other
Moderately positive correlation	Both lines have a positive slope	0 < r < +1	Rise in one variable leads to rise in other
Moderately negative correlation	Both lines have a negative slope	–1 < r < 0	Rise in one variable leads to fall in other
No (absent) correlation	Both lines are perpendicular	r = 0	Rise/ fall in one variable leads to no change in other
Spurious (false) correlation	No particular pattern observed	–	No particular pattern observed

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Variables

- *Definition:* Is a characteristic or attribute that vary from person to person, from time to time and from person to person.

Quantitative variable[Q]	Qualitative variable[Q]
Is a variable that can be measured directly	Is a variable that cannot be measured directly
Measured on ordinal/metric scale	Measured on a nominal scale
Examples: Weight Height Mid-arm circumference Blood sugar level °C/ °F temperature scale Body mass index (BMI) Hemoglobin level Serum cholesterol level	*Examples:* ABO blood group Gender Sites of lymphadenopathy Presence of Diabetes Weather Obesity Type of anemia

Discrete variable[Q]	Continuous variable[Q]
Is a variable that has few possible values & no in-between values	Is a variable that has large no. of possible values & several in-between values
Measured on nominal/ ordinal scale	Measured on a metric scale
Examples: ABO blood group Gender Sites of lymphadenopathy Presence of Diabetes Parity Obesity No. of living children in a family	*Examples:* Weight Height Mid-arm circumference Blood sugar level °C/ °F temperature scale Body mass index (BMI) Hemoglobin level Serum cholesterol level

I Continuous variable:
Is a variable that has large no. of possible values & several in-between values

Dichotomous (Binary) variable[Q]	Polyotomous variable[Q]
Is a variable that has only 2 possible values	Is a variable that has > 2 possible values
Examples: Rh blood group Weight > 80 kg Gender Presence of Diabetes Obesity Temperature < 12°C Blood group B	*Examples:* ABO blood group Weight Height Mid-arm circumference Blood sugar level °C/ °F temperature scale Body mass index (BMI) Hemoglobin level Serum cholesterol level

I Dichotomous (Binary) variable:
Is a variable that has only 2 possible values

Scales of Measurement

	Categorical scales		Dimensional scales
	Nominal scale[Q]	Ordinal scale[Q]	Metric scale[Q]
Definition	Based on NOM (names); no specific order	Based on ORD (order); grading into categories	Based on ME (measurement); in terms of quantities
Variables	Qualitative	Qualitative	Quantitative
Examples	Race Religion Country of birth Clinical features Sites of lymphadenopathy Sex of child Type of anemia ABO blood group Site of malignancy	TNM staging (cancers) Severity of a disease Social classes	Blood glucose Hemoglobin level Serum cholesterol Weight Height Mid-arm circumference Blood pressure Pulse rate Temperature (°C, °F, K) scale

I Nominal scale:
Based on NOM (names)

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	Counting	> or < operations	Interval scale: +/ – Ratio scale: X/ ÷
	Mode, Chi–square	Median, Percentile	Interval scale: Mean, SD, Correlation, Regression, ANOVA Ratio scale: Geometric mean, Harmonic mean, Coefficient of variation

- *Metric scale is of 2 types*[Q]:
  - *Interval scale (Absence of absolute zero; no ratios are possibl(e):* Examples: Centigrade/ Fahrenheit temperature scale[Q].
  - *Ratio scale (Presence of absolute zero; thus ratios are possibl(e):* Examples: Weight, Height, Blood glucose, Hemoglobin level, Serum cholesterol, Mid-arm circumference, Blood pressure, Pulse rate, Kelvin temperature scale[Q].

Likert Scale

I Likert Scale: 'Responses are graded on a continuum'

- Is also known as 'Summative scale'[Q]
- Is a 'type of Ordinal scale'[Q]
- Is generally used to quantify attitudes and behaviour
- 'Responses are graded on a continuum' (For example: Strongly agree – Agree – Neutral – Disagree – Strongly disagree)[Q]
- No. of responses are usually 3, 5 or 7
- Likert scale is 'usually a bipolar scaling' method: It measures positive or negative response to a statement
- *Likert response can be:*
  - Collated into bar charts
  - Central tendency summarized as median or mode (NOT mean)
  - Dispersion summarized by range (NOT standard deviation)
  - Analyzed by non-parametric tests.

Measures of Central Tendency

Measures of Central Tendency[Q]

I Median: Middlemost value in a distribution arranged in an ascending or descending order

I Mode: Most frequent or most commonly occurring value in a distribution

- *Mean (Average):* Is obtained as sum of all values divided by the no. of values[Q].

  $$\text{Mean} = \sum x/n$$

- *Median:* Middlemost value in a distribution arranged in an ascending or descending order of values[Q].
  - *In a distribution with odd no. of total values:* Middlemost value in a distribution arranged in an ascending or descending order of values[Q].

    Median = ((n + 1)/2)th value in ascending order
  - *In a distribution with even no. of total values:* Such a distribution has 2 middlemost values; median is the average of two middlemost values when arranged in an ascending or descending order of values[Q].

  Median = Mean (average) of (n /2)th and (n/2 + 1)th value in ascending order
- *Mode:* Most frequent or most commonly occurring value in a distribution
  - *In a distribution with one most frequent value:* Mode is the most frequent or most commonly occurring value in the distribution[Q].
  - *In a distribution with two most frequent values:* 2 Modes (2 most frequent values in the distribution) known as Bimodal distribution; thus Mode = Average of 2 modes.

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Central tendency in Various Distributions

Distribution	Central tendency[Q]
Normal (Gaussian) distribution	Mean = Median = Mode (coincide)
Right (Positive) skew distribution	Mean > Median > Mode
Left (Negative) skew distribution	Mean < Median < Mode

I Right (Positive) skew distribution
Mean > Median > Mode

- *In a bimodal series*, Mode = 3Median – 2mean
- *In distribution with extreme values (Outliers):*
  - Most affected measure of central tendency: Mean[Q]
  - Least affected measure of central tendency: Mode[Q]
  - Most preferable measure of central tendency: Median[Q].

Other Measures of Location

Various Measures of Location

	Divides distribution into	No. of intercepts
Tertile	3 equal parts	2
Quartile[Q]	4 equal parts	3
Pentile (Quintile[Q])	5 equal parts	4
Hextile	6 equal parts	5
Heptile	7 equal parts	6
Octile	8 equal parts	7
Decile	10 equal parts	9
Centile (Percentile[Q])	100 equal parts	99

I Quartile: 4 equal parts
Quintile: 5 equal parts

Tertile

- *Tertile:* Divides a distribution into 3 equal parts, so the number of intercepts required will be 2, i.e. T1, T2
  - T1 (1st tertile) divides a distribution in a ratio of 33 : 66 OR 1 : 2
  - T2 (2nd tertile) divides a distribution in a ratio of 66 : 33 OR 2 : 1.

Quartile

- *Quartile:* Divides a distribution into 4 equal parts, so the number of intercepts required will be 3, i.e. Q1, Q2, Q3
  - Q1 (1st Quartile[Q]) divides a distribution in a ratio of 1 : 3
  - Q2 (2nd Quartile[Q]) divides a distribution in a ratio of 1 : 1
  - Q3 (3rd Quartile[Q]) divides a distribution in a ratio of 3 : 1.

I Q2 (2nd QuartileQ) divides a distribution in a ratio of 1 : 1

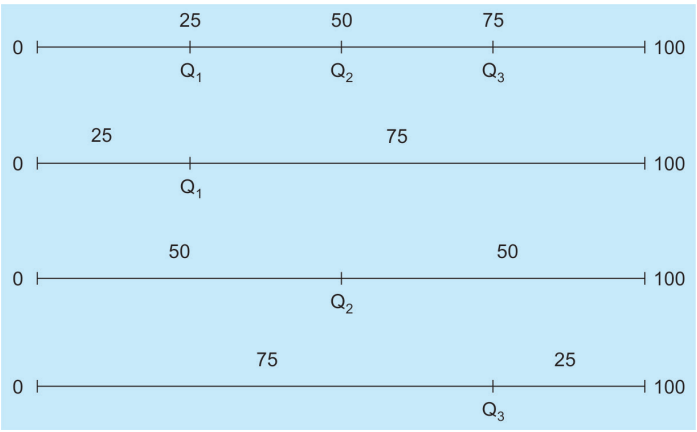

Figure: Quartiles

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Pentile

- Pentile (QUINTILE): Divides a distribution into 5 equal parts, so the number of intercepts required will be 4, i.e. P1, P2, P3, P4
  - P1 (1st pentile) divides a distribution in a ratio of 20 : 80 OR 1 : 4
  - P2 (2nd pentile) divides a distribution in a ratio of 40 : 60 OR 2 : 3
  - P3 (3rd pentile) divides a distribution in a ratio of 60 : 40 OR 3 : 2
  - P4 (4th pentile) divides a distribution in a ratio of 80 : 20 OR 4 : 1.

Centile (Percentile)

I Centile (Percentile): Divides a distribution into 100 equal parts.

- Divides a distribution into 100 equal parts, AFTER arranging in an ascending order, SUCH THAT each part/segment has equal number (n/100) of subjects[Q].
- Requires 99 intercepts (cut-off points) for division into 100 parts
- *Total percentiles:* 99[Q].
- *The nth percentile implies:* When all values are arranged in ascending order, n% are below this value
- *Methods for location of percentiles:*
  - *Graphical method:* Cumulative frequency diagram (Ogive)
  - *Arithmetic method:* Cumulative frequency table
- *Applications and uses of percentiles[Q]:*
  - Location of a percentile
  - Preparation of a standard percentile (Q2, Median) for particular age, sex, etc.
  - Comparison of a percentile value of a variable (between samples or populations)
  - To study growth in children (using growth charts)
  - As a measure of dispersion (interquartile/semi-interquartile range).

VARIABILITY

Measures of Variability

Measures of Variability[Q]	
Individual observations	**Samples**
Range	Standard error of mean
Inter-quartile range	Standard error of difference between 2 means
Mean deviation	Standard error of proportion
Standard deviation	Standard error of difference between 2 proportions
Coefficient of variation	Standard error of correlation coefficient
	Standard deviation of regression coefficient

Standard Deviation (SD)

I SD is most common and generally most appropriate measure of dispersion[Q] SD is defined as the 'root-mean-square (RMS) deviation

- SD is most common and generally most appropriate measure of dispersion[Q]
- SD is defined as the 'root-mean-square (RMS) deviation of the values from their mean', or as the square root of the variance[Q]

  SD (σ) calculation: = $\sqrt{}$Variance = $\sqrt{\sum (x - x)^2/n}$
- *Interpretation of SD:*
  - *A large standard deviation:* Data points are far from the mean
  - *A small standard deviation:* Data points are clustered closely around the mean
- *Uses of SD in biostatistics:*
  - Summarizes the deviation of a large distribution from mean
  - Indicates whether the variation of difference of an individual from the mean is by chance
  - Helps in finding the standard error
  - Helps in finding the suitable size of sample for valid conclusions.

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Coefficient of Variation (COV)[Q]

- Is a measure used to compare relative variability
- Is a unit-free measure to compare dispersion of one variable with another
- Is SD expressed as percentage of mean

$$COV = SD/Mean \times 100 = \sigma/\mu \times 100$$

I COV = SD/Mean × 100 = σ/μ × 100

Standard Error of Mean (SE mean)

- SE mean is the measure of difference between sample and population values: Whatever be the sampling procedure or the care taken while selecting sample, the sample estimates (statistics) will differ from population values (parameters)
- SE is a measure of variability of sample summaries: SEmean is the SD of sample means[Q]
- SE is a 'measure of chance variation', and IT DOESNOT mean an error or mistake[Q]

$$SE\ mean = Standard\ deviation\ (SD)/\sqrt{Sample\ size} = \sigma/\sqrt{n}$$

I SE mean = Standard deviation (SD)/√Sample size = σ/√n

- *Importance of SE mean:*
  - Greater the standard deviation (σ), greater will be the standard error (SE), especially in small samples
  - SE can be minimized by reducing SD: By taking a large sample
  - SE is a measure of variability of sample summaries: SEmean is the SD of sample means
- *Uses of standard error of mean (SEmean) in large samples:*
  - To work out limits of desired confidence within which population mean would lie
  - To determine if sample is drawn from a known population or not
  - To find SE of difference between 2 means (to know if difference is real and statistically significant)
  - To calculate sample size (within desired confidence limits)
  - *Standard error of difference between 2 means[Q]:*

$$SE\ diff\ bet\ means = \sqrt{(\sigma_1^2/n_1 + \sigma_2^2/n_2)}$$

  - *Standard error of proportion[Q]:*

$$SE\ proportion = \sqrt{pq/n}\ ;\ where\ q = (1 - p)$$

  - *Standard error of difference between 2 proportions[Q]:*

$$SEdiff\ bet\ proportions = \sqrt{(p_1q_1/n_1) + (p_2q_2/n_2)}$$

Z Score (Standard Score)

- Is also known as 'normal deviate'[Q]
- Is difference of a value from group mean, in terms of how many times of SD (σ)

$$Z\ score = (Individual\ level - Mean)/Standard\ deviation = (x - \mu)/\sigma$$

I Z score = (Individual level − Mean)/Standard deviation = (x − μ)/σ

- Standard score indicates how many standard deviations an observation is above or below the mean
- Z scores are frequently used in assessing how far a child is in his relative growth to a standard
- Z score = 2: Any measurement of atleast 2SD away is considered too far away to be normal.

DISTRIBUTIONS – NORMAL AND SKEWED

Poisson Distribution

- Is a 'discrete probability distribution' that expresses the 'probability of a number of events occurring in a fixed period of time'[Q] (if these events occur with a known average rate and independently of the time since the last event).
- It can also be used for the number of events in other specified intervals such as distance, area or volume.

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- Is generally used to model the number of events occurring within a given time interval.
- Is a discrete distribution which takes on the values X = 0, 1, 2, 3,….

Normal Distribution

- Is also known as 'Gaussian distribution' or 'Standard distribution'[Q]
- Type of distribution: Is the distribution of values of a quantitative variable such that they are symmetric with respect to a middle value with same mean, median and mode, and then the frequencies taper off rapidly and symmetrically on both sides – 'bell shaped distribution'.

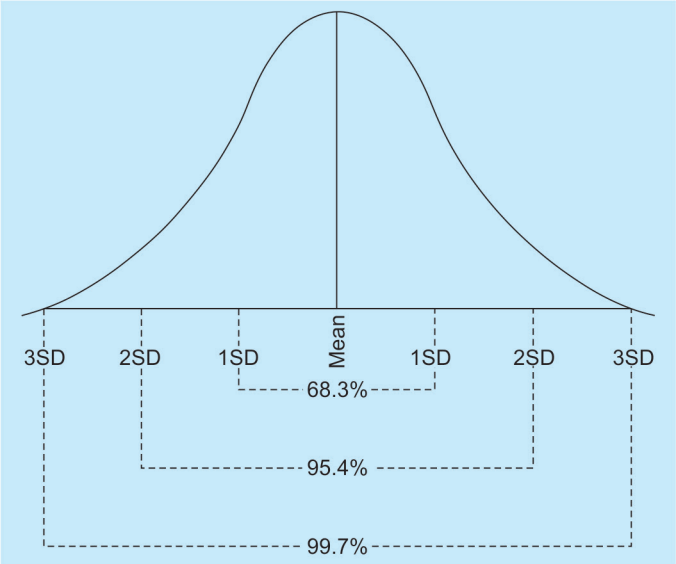

Figure: Normal curve showing distribution of values

- Is 'bilaterally symmetrical, bell-shaped'[Q]
- Is based on mean (μ) and standard deviation (σ)
- Mean, Median and Mode coincide (Mean = Median = Mode)[Q]
- Has Mean (μ) = 0 and SD (μ) = 1[Q]
- SD = √Variance OR Variance = σ^2
  - In Normal distribution, SD (σ) = 1, thus Variance = 1[Q]
- Mean ± 1SD (μ ± 1σ) covers 68% values[Q]
- Mean ± 2SD (μ ± 2σ) covers 95% values[Q]
- Mean ± 3SD (μ ± 3σ) covers 99% values[Q]
- Actual parameters in a Normal (Gaussian) distribution:
  - Mean ± 1SD (μ ± 1σ) limits include 68.27% values
  - Mean ± 2SD (μ ± 2σ) limits include 95.45% values
  - Mean ± 1.96SD (μ ± 1.96σ) limits include 95% values
  - Mean ± 3SD (μ ± 3σ) limits include 99.73% values
  - Mean ± 2.58SD (μ ± 2.58σ) limits include 99% values.

I
- (μ ± 1σ) covers 68% values[Q]
- (μ ± 2σ) covers 95% values[Q]
- (μ ± 3σ) covers 99% values[Q]

Skewness of Central Tendency

- *Description:* Is measure of asymmetry of a probability distribution of a random variable
- *Measures of skewness:*
  - Pearson's mode or First Skewness coefficient[Q] = (Mean – Mode)/SD
  - Pearson's median or Second Skewness coefficient = 3(Mean – Median)/SD
  - Quartile skewness = (Q3 – 2Q2 + Q1)/ Q3 – Q1
- *Asymmetrical distributions:*
  - *Right (positive) skew:* Mean > Median > Mode[Q]
  - *Left (negative) skew:* Mean < Median < Mode[Q]

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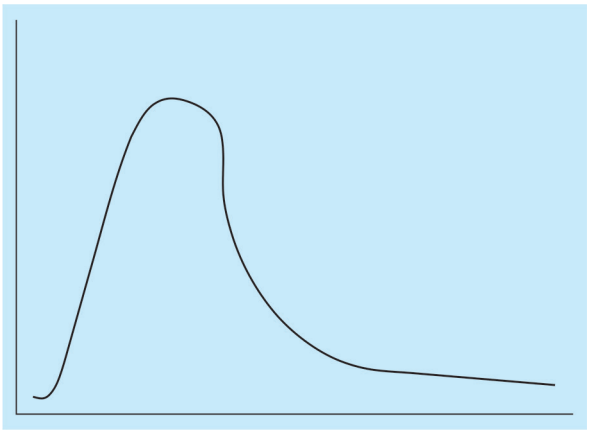

Figure: Right skewed curve

- Left (negative) skew: Mean < Median < Mode[Q]

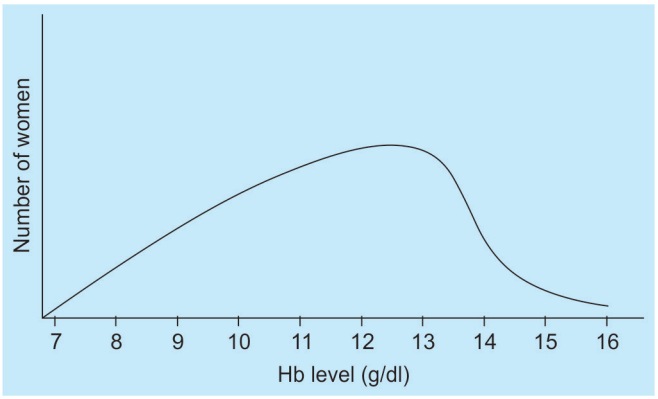

Figure: Left skewed curve

SAMPLING

Sample Size Estimation

- *Sample size depends upon*[Q]*:*
  - the effect size (usually the difference between 2 groups)
  - the population standard deviation (for continuous data)
  - the desired power of the experiment to detect the postulated effect (Power = 1–β)
  - the significance level (α).

I (Power = 1–β)

Types of Sampling

	Random Sampling[Q]	Non-random sampling[Q]
Synonyms	Probability sampling[Q] Non-purposive sampling	Non-probability sampling Purposive sampling[Q]
Types	Simple random sampling Systematic random sampling Stratified random sampling Multistage random sampling Multiphase random sampling Cluster random sampling	Convenience sampling Quota sampling Snow-ball sampling Clinical trial sampling

Types of Random Sampling

- *Simple Random Sampling*
  - Every unit of population has equal and known chance of being selected[Q]

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- Is also known as 'unrestricted random sampling'
- Applicable for small, homogenous and readily available populations
- Used in clinical trials
- Methods of Simple random sampling[Q]:
  * Lottery method
  * Random no. tables
  * Computer software.

- **Systematic Random Sampling**
  - Based on sampling fraction: Every Kth unit is chosen in the population list, where K is chosen by sampling interval
  - Sampling Interval (K) Q = Total no. of units in population/ Total no. of units in sample
  - Applicable for large, non-homogenous populations where complete list of individuals is available
  - For example, if there is a population of 1000 from which sample of 20 is to be chosen, then K = 1000/20 = 50; thus every 50th unit will be included in the sample (i.e. 1st, 51st, 101st, so on…) First unit among first 50 is chosen by simple random sampling.
- **Stratified Random Sampling**
  - Non-homogenous population is converted to homogenous groups/classes (strata); sample is drawn from each strata at random, in proportion to its size[Q]
  - Applicable for large non-homogenous population
  - Gives more representative sample than simple random sampling
  - None of the categories is under or over-represented
  - For example, In a population of 1000, sample of 100 is to be drawn for Hemoglobin estimation; first convert non-homogenous population is converted to homogenous strata (i.e. 700 males and 300 females), then draw 70 males and 30 females randomly respectively.
- **Multistage Random Sampling**
  - Is done in successive stages; each successive sampling unit is nested in the previous sampling unit[Q]
  - Advantage: Introduces flexibility in sampling
  - For example, in large country surveys, states are chosen, then districts, then villages, then every 10th person in village as final sampling unit
- **Multiphase Random Sampling**
  - Is done in successive phases; part of information is obtained from whole sample and part from the sub-sample[Q]
  - For example, in a TB survey, Mantoux test done in first phase, then X-ray done in all Mantoux positives, then sputum examined in all those with positive X-ray findings.
- **Cluster Random Sampling**
  - Applicable when units of population are natural groups or clusters
  - *Use in India:* Evaluation of immunization coverage[Q]
  - *WHO technique used:* 30 × 7 technique (total = 210 children)[Q]
  - *WHO technique used in CRS:* 30 × 7 technique (total = 210 children)
    * 30 clusters, each containing
    * 7 children who are 12 – 23 months age and are completely immunized for primary immunization (till Measles vaccine)[Q]
    * Clusters are heterogeneous within themselves but homogenous with respect to each other
    * Sampling interval is also calculated in CRS
  - *Accuracy*[Q]*:* Low error rate of only ± 5%
  - *Limitation:* Clusters cannot be compared with each other[Q].

I

CRS
Use in India: Evaluation of immunization coverage
30 × 7 technique

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Types of Non-Random Sampling[Q]

- *Convenience Sampling*
  - Patients are selected, in part or in whole, at the convenience of the researcher; no/limited attempt to ensure that sample is an accurate representation of population[Q]
  - For example, standing at a shopping mall and selecting shoppers as they walk by to fill out a survey.
- *Quota Sampling*[Q]
  - Population is first segmented into mutually exclusive sub-groups (quotas), just as in stratified sampling; then judgment is used to select the units from each group non-randomly
  - Is a type of convenience sampling.
- *Snow-ball Sampling*[Q]
  - A technique for developing a research sample where existing study subjects recruit future subjects from among their acquaintances; thus the sample group appears to grow like a rolling snowball
  - Is often used in hidden populations which are difficult for researchers to access, e.g. drug users or commercial sex workers[Q].
- *Clinical Trial Sampling.*

> *I* Snow-ball Sampling: Is often used in hidden populations

PROBABILITY AND ODDS

Bayes' Theorm

Refer to Chapter 4, Theory.

Probability

- Probability: Is the chance that some event will occur
- Probability range: 0 to +1 (0% to 100%)
  - Probability can never be zero[Q]
  - Probability cannot exceed one[Q].

Addition Rule of Probability

- *Rule of addition*[Q]*:* Probabilities are added for mutually exclusive events i.e. P(Total) = P(A) + P(B)
- For example, If probability of having birth weight < 2500 grams (P (A)) is 0.50 (50%), birth weight 2500 – 2999 grams (P(B)) is 0.30 (30%) and birth weight > 3 kg (P (C)) is 0.20 (20%),
  - Probability of having birth weight < 3 kg (P (T1)) will be; P (T1) = P (A) + P (B) = 0.50 + 0.30 = 0.80 (80%) as both events are mutually exclusive
  - Similarly, probability of having birth weight > 2500 (P (T2)) will be; P (T2) = P (B) + P (C) = 0.30 + 0.20 = 0.50 (50%) as both events are mutually exclusive

Multiplication Rule of Probability

- *Rule of multiplication*[Q]*:* Probabilities are multiplied for obtaining joint occurrence of two or more independent events i.e. P(Total) = P(A) × P(B)
- For example, If probability of having birth weight < 3 kg (P (C)) is 0.70 (70%), probability of having birth weight > 3 kg (P (D)) is 0.30 (30%) AND Probability of being of male sex (P (E)) is 0.50 (50%), and probability of being of female sex (P (F)) is 0.50 (50%)
  - Probability of having a child with birth weight < 3 kg and of male sex will be P (T3) = P (C) × P (E) = 0.70 × 0.50 = 0.35 (35%) as both are independent events
  - Similarly, Probability of having a child with birth weight < 3 kg and of female sex will be P (T4) = P (C) × P (F) = 0.70 × 0.50 = 0.35 (35%) as both are independent events

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- Probability of having a child with birth weight > 3 kg and of male sex will be P (T5) = P (D) × P (E) = 0.30 × 0.50 = 0.15 (15%) as both are independent events
- Probability of having a child with birth weight > 3 kg and of female sex will be P (T6) = P (D) × P (F) = 0.30 × 0.50 = 0.15 (15%) as both are independent events
- Total probability of a child being borne with any characteristic (P (T)) will be P (T) = P (T3) + P (T4) + P (T5) + P (T6) = 0.35 + 0.35 + 0.15 + 0.15 = 1 (100%).

Odds

I Probability = Odds/(1 + Odds)

- *Odds:* Odds are the chance of frequency of occurrence of a characteristic relative to its non-occurrence (expressed as a ratio of occurrence to non-occurrence)[Q]

Odds = Probability/(1 – Probability)

Probability = Odds/(1 + Odds)

Tests of Statistical Significance

Parametric tests and Non-parametric tests

	Parametric tests[Q]	Non-parametric tests[Q]
Based on[Q]	Gaussian/Normal distributions	Non – normal distributions
Type of data[Q]	Quantitative	Qualitative
Compares[Q]	Means (+ SD)	Percentage, proportions & fractions
Examples[Q]	Students (paired) t - test Students (unpaired) t - test ANOVA F - test	Sign test Chi-square test (χ^2 - test) Wilcoxan test (signed rank) Wilcoxan test (rank sum)

Parametric Tests[Q]

I Paired Student's t-test[Q]: Comparing means (+ SD) in paired data

- *Paired Student's t-test*[Q]*:* Comparing means (+ SD) in paired data (in same group of individuals before and after an intervention)
  - Example: Mean serum albumin level of dengue patients before treatment was 3.6 g/dL and after treatment was 3.2 g/dL; Comparison of mean levels can be done by Paired Student's t-test
- *Unpaired Student's t-test*[Q]*:* Comparing means (+ SD) in two different group of individuals
  - Example: Mean Hb level of anemia patients was 9.6 g/dL and those of hookworm patients was 7.2 g/dL; Comparison of mean levels can be done by Unpaired Student's t-test
  - Z - test: Is a variant of student's t-test which is used when sample size is > 30
- *ANOVA test (F-test/F-ratio)*[Q]*:* Comparing means (+ SD) in more than two different group of individuals
  - Example: Mean weight of students in class A is 50 kg, those of class B is 44.6 kg and those of class C is 52.7 kg; Comparison of mean weights can be done by ANOVA test.

Non-parametric Tests[Q]

I Chi-square test (χ^2 – test[Q]: Comparing percentage, proportions & fractions in two or more different group of individuals

- *Sign test*[Q]*:* Comparing percentage, proportions & fractions in paired data (in same group of individuals before and after an intervention)
  - Example: 30% of students in a class are anaemic, after 6 months of IFA therapy, now 20% of students are anaemic; Test of significance to be applied is Sign test
- *Chi-square test (χ^2 – test)*[Q]*:* Comparing percentage, proportions & fractions in two or more different group of individuals
  - Example: Three-fourth of students in a class are underweight whereas another class has two-thirds anaemic; test of significance to be used is Chi-square test
  - Fischer's test: Is a variant of Chi-square test when sample size is < 30

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- *Wilcoxan tests*[Q]*:*
  - *Wilcoxon (signed rank) test:* Comparing percentage, proportions & fractions in matched paired data
  - *Wilcoxon (rank sum) test:* Comparing percentage, proportions & fractions in two unpaired samples
  - *Mann-Whitney (Wilcoxon) test:*
    * MWW is same as Wilcoxon (rank sum) test
    * Is used for assessing whether two set of observations come from same distribution (if 2 independent 'nonpaired' samples come from the same population)
    * 'MWW is analogous to parametric two-sample t-test' on the data after ranking over the combined samples
    * MWW requires calculation of 'U statistic'.

Chi-Square Test (χ^2 Test)

- Is a 'non-parametric test' of significance[Q]
- Is used to 'test significance of association between 2 or more qualitative characteristics'[Q]
- Is used to compare proportions in 2 or more groups[Q]
- Is used for non-Normal (non-Gaussian) distributions
- *Applications of Chi-square test:*[Q]
  - Test of proportions
  - Test of association
  - Test of goodness of fit
- *Essential requirements for calculation of Chi-square test:*[Q]
  - Random sample
  - Qualitative data
  - Lowest expected frequency not < 5.

I

CHI-SQUARE TEST
Is used to 'test significance of association between 2 or more qualitative characteristics'[Q]

Degrees of Freedom

- *Degree of freedom:* Is the no. of observations in a dataset that can freely vary once the parameters have been estimated.
- *Used in Chi-square test and t-test:*
  - In a Chi-square test, contingency table, dof = (c – 1) (r – 1) (where c = no. of columns and r = no. of rows)[Q]
  - In a Student's t-test (one-sample data/paired test), dof v = n – 1 (where n = no. of units in the sample)
  - In a Student's t-test (two-sample data/unpaired test), dof v = $(n_1 + n_2) - 1$ (where n1 and n_2 = no. of units in the two samples).

I

dof = (c – 1) (r – 1)

CORRELATION AND REGRESSION

Correlation

- *Description:* Is relationship between 2 quantitative or continuous variables[Q]
- *Correlation is represented by:* 'Scatter diagram'[Q]
- *Correlation coefficient (r):* Measures the degree or strength of relationship in a correlation
  - Correlation coefficient (r) lies between: –1 to +1 (–1 < r < +1)[Q]
- *Strength of correlation:*
  - Weak positive correlation: 0 < r < 0.3
  - Moderate positive correlation: 0.4 < r < 0.6
  - Strong positive correlation: r > 0.7
- *Correlation is represented by: 'Scatter diagram'*
- *Correlation coefficients:*

I

Correlation coefficient (r) lies between: –1 to +1 (–1 < r < +1)[Q]

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- *Pearson's Correlation coefficient*[Q]:
  - * Is used in ungrouped series
  - * Is used when associated variables are normally distributed
  - * Symbol is 'r'
- *Spearman's Rank Correlation coefficient*[Q]:
  - * Is used in grouped series
  - * Is used when associated variables are not normally distributed
  - * Symbol is 'rho (ρ)'
- *Multiple correlation coefficient:* Is used for calculation of correlation between one variable (dependent) and the combination of two or more variables (independents)

- *Coefficient of determination:*[Q]
  - Is the percentage of variation in a variable that is explained by one or more of the others[Q]
  - Is generally obtained in a regression setup
  - Coefficient of determination[Q] = (Correlation coefficient)^2 = r^2. ($0 < r^2 < +1$)

Regression

- *Description:* Is change in measurements of a variable
  - Provides structure of relationship between 2 quantitative variables[Q]
- *Regression Coefficient (b):* Measure of change of one dependent variable (y) with change in independent variable (x) or variables (x_1, x_2, x_3……)
- *Equations of regression,*
  $y = a + b(x)$
  $y = a + b(x_1) + c(x_2) + d(x_3)$,
  where y is a dependent variable and x, x_1, x_2, x_3 are independent variables; a is a constant and b, c, d are regression coefficients
- *Types of regressions*[Q]:
  - *Simple linear regression:* Only one dependent variable and one independent variable
  - *Multiple linear regression:* Only one dependent variable and more than one independent variable
  - *Simple curvilinear regression:* Only one dependent variable and one independent variable, with some power of independent variable
  - *Multiple curvilinear regression:* Only one dependent variable and more than one independent variables, with some power of independent variables).
- *Types of regression equations:*

Types of regression	Equation[Q]
Simple linear regression	$y = a + b(x)$
Multiple linear regression	$y = a + b(x_1) + c(x_2) + d(x_3)$
Simple curvilinear regression	$y = a + b(x)^6$
Multiple curvilinear regression	$y = a + b(x_1)^2 + c(x_2)^4 + d(x_3)^3$

I
Simple linear regression
$y = a + b(x)$

Other types of regressions:

Types of regressions	Features	
	Dependent variables	Independent variables
Logistic regression[Q]	Qualitative, dichotomous	Qualitative/Quantitative/ Mixed
ANOVA	Quantitative	Qualitative
ANCOVA	Quantitative	Qualitative + Quantitative
Multivariate multiple regression	Set of Quantitative	Set of Quantitative
MANOVA	Set of Quantitative	Set of Qualitative
Multivariate logistic regression	Set of Qualitative	Qualitative/ Quantitative

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ERRORS AND P-VALUE

Null Hypothesis

- *Hypothesis (H):* Is an assumption about the status of a phenomenon
- *Null Hypothesis (H_0):* In Biostatistics, when we have to prove a particular hypothesis about difference between 2 regimens, we make Null Hypothesis (For examples, If we have to prove that new treatment is better than older treatment, H_0 = new treatment is not better than older treatment)Q.

Statistical Errors & P-value

- *Statistical errors*Q*:*

	H_0 rejected	H_0 not rejected
Null Hypothesis (H_0) true	Type I error	No error
Null Hypothesis (H_0) false	No error	Type II error

- *Type I Error:*
  - Null hypothesis is true but rejectedQ
  - Probability of Type I error is given by 'P – value' (probability of declaring a significant difference when actually it is not present)Q
  - Significance (α) level: is the maximum tolerable probability of Type I errorQ
  - Alpha is fixed in advance: P – value calculated can be less than, equal to or greater than alpha (α)
  - Keep Type I error to be minimum (P < α): Then results are declared statistically significantQ.
- *Type II Error:*
  - Null hypothesis is false but not rejected (or accepted)Q
  - Probability of Type II error is given by beta (β) (probability of declaring no significant difference when actually it is present)Q
  - Type I error is more serious than Type II errorQ.

I

Type I Error:
- Null hypothesis is true but rejectedQ
- Probability of Type I error is given by 'P – value'

I

Type II Error:
Null hypothesis is false but not rejected

Power of a Test

- *Description:* Is probability of rejecting a Null hypothesis when a predetermined clinically significant difference is indeed present
  - Measures the ability to demonstrate an association, when one really exists
- *Power of a statistical test:* 1–β (1–Probability of Type II error)Q
- *Power of a statistical test is a numeric representation of:* Sensitivity
- *Power of a statistical test can be increased by*Q*:*
  - Increasing the no. of subjects in a trial (sample size)
  - Reducing β (probability of Type II error)
  - Increasing sensitivity
- Power of a statistical test is also used for calculation of sample size for a studyQ.

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Power of a statistical test: 1–β

MISCELLANEOUS

Validity

- *Validity:* Refers to what extent the test measures which it purports to measure (adequacy of measurement)Q
- *Validity has 2 components*Q*:*
  - Sensitivity
  - Specificity
- *Types of Validity:*
  - *Conclusion validity:* Defines if there is a relationship between 2 variables

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- *Internal validity:* Assuming relationship between 2 variables, defines if it is causal
  * Is free of bias
  * Valid conclusions can be drawn for individuals in a sample
- *Construct validity:* Assuming causal relationship between 2 variables, defines if our theory is best to our constructs
- *External validity:* Assuming causal relationship between 2 variables, defines if our theory can be generalized to the broader population
- *Concurrent validity:* refers to the degree of correlation with other measures of the same construct measured at the same time
- *Face (Logical) validity:* Relevance of a measurement appear obvious
- *Content validity:* Measurement of all variable components
- *Consensual validity:* If no. of experts agree to a parameter
- *Criterion validity:* If compared with a reference or gold standard
  * Is best measure of validity[Q]
  * Usually expressed as sensitivity & specificity[Q]
- *Discriminant validity:* If not showing strong correlation between 2 variables.

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Criterion validity: If compared with a reference or gold standard
* Is best measure of validity[Q]
* Usually expressed as sensitivity & specificity[Q]

Delphi Method

- *Delphi method:* Is a 'systematic interactive forecasting method' for obtaining consensus forecasts from a panel of independent experts[Q]
- *Method:* The carefully selected experts answer questionnaires in two or more rounds; After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments; Thus, participants are encouraged to revise their earlier answers in light of the replies of other members of the group.
  - The range of the answers decrease and the group will converge towards the 'correct' consensual answer; Finally, the process is stopped after a pre-defined stop criterion (e.g. number of rounds, achievement of consensus, stability of results) and the mean or median scores of the final rounds determine the results.
  - Objective of most Delphi applications: The reliable and creative exploration of ideas or the production of suitable information for decision-making
  - Delphi Method is based on: A structured process for collecting and distilling knowledge from a group of experts by means of a series of questionnaires interspersed with controlled opinion feedback
  - Delphi method is an exercise in group communication among a panel of geographically dispersed experts
  - In general, the Delphi method is useful in answering one, specific, single-dimension question
- *Mini-Delphi or Estimate-Talk-Estimate (ETE):* The delphi technique when adapted for use in face-to-face meetings.

Confidence Intervals, Levels, Limits

- *Confidence interval (CI):* Is the interval within which a parameter value is expected to lie with certain confidence levels, as could be revealed by repeated samples
  - Is the 'range that is likely to contain the population mean when so obtained for repeated samples'[Q].
  - A narrow CI is always preferable: as it tells more precisely what might be the population mean BUT also it will have higher chances of not containing the population mean[Q].
  - Larger the sample size, narrower is CI[Q].
  - Smaller the SD (σ), narrower is CI

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Larger the sample size, narrower is CIQ.
Smaller the SD (s), narrower is CI

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- *Confidence level:*
  - Is the level of hope or expectation fixed at a sufficiently high level while dealing with samples, to ensure high reliability
  - Is the 'degree of assurance for an interval to contain the value of the parameter'Q
  - There is NO WAY to achieve 100% confidenceQ
  - Internationally acceptable confidence level: 95%Q
  - Maximum tolerance of probability of Type I error (α) is the probability that CI would not contain the population meanQ
  - Confidence levelQ = 1 – α
- *Confidence limits:* Are the upper and lower boundaries of a confidence intervalQ.

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MULTIPLE CHOICE QUESTIONS

DATA, VARIABLES AND SCALES

1. **Histogram is used to describe:** *[AIIMS Dec 1995]*
   (a) Quantitative data of a group of patients
   (b) Qualitative data of a group of patients
   (c) Data collected on nominal scale
   (d) Data collected on ordinal scale

2. **Which of the following variables is measured on the ordinal scale?** *[AIPGME 1996]*
   (a) Type of anemia
   (b) Severity of anemia
   (c) Hemoglobin level
   (d) Serum ferritin level

3. **Measurement of blood pressure is which type of data:**
   (a) Nominal *[AIPGME 1996]*
   (b) Ordinal
   (c) Interval
   (d) Continuous

4. **Histogram is used to present which kind of the data:**
   (a) Nominal *[AIIMS May 2006]*
   (b) Continuous
   (c) Discrete
   (d) Any of above

5. **All of the following are quantitative variables *except*:**
   (a) Serum cholesterol *[AIPGME 1996]*
   (b) Weight
   (c) Gender
   (d) Celsius temperature scale

6. **All of the following methods can show relationship between two variables *except*?** *[AIPGME 1995]*
   (a) Histogram
   (b) Line diagram
   (c) Bar chart
   (d) Scatter plot

7. **A physician, after examining a group of patients of a certain disease, classifies the condition of each one as 'Normal', 'Mild', 'Moderate' or 'Severe'. Which one of the following is the scale of measurement that is being adopted for classification of the disease condition?** *[AIIMS Nov 92 Dec 98, May 94, AIPGME 04, 07]*
   (a) Normal
   (b) Interval
   (c) Ratio
   (d) Ordinal

8. **Mean and standard deviation can be worked out only if data is on:** *[AIIMS Nov 03, AIIMS May 05]*
   (a) Interval/Ratio scale
   (b) Dichotomous scale
   (c) Nominal scale
   (d) Ordinal scale

9. **In statistical literature data are broadly classified as interval scale data, ordinal scale data & categorical data. Blood groups will be an example for:** *[AIIMS Dec 1994]*
   (a) Interval scale data
   (b) Ordinal scale data
   (c) Categorical data
   (d) None of the above

10. **An investigator into the life expectancy of IV drug abusers divides a sample of patients into HIV- positive and HIV-negative groups. What type of data does this division constitute?** *[AIIMS June 2000]*
    (a) Nominal
    (b) Ordinal
    (c) Interval
    (d) Ratio

11. **A Scatter diagram is drawn to study:** *[AIIMS June 1997]*
    (a) Trend of a variable over a period of time
    (b) Frequency of occurrence of events
    (c) Mean & median values of the given data
    (d) Relationship between two given variables

12. **The response which is graded by an observer on an agree or disagree continuum is based on:**
    (a) Visual analog scale *[AIPGME 2003]*
    (b) Guttman Scale
    (c) Likert Scale
    (d) Adjectival scale

13. **In a study following interpretation are obtained: Satisfied, Very satisfied, Dissatisfied. Which type of scale is this?** *[AIIMS May 2010, AIPGME 2003]*
    (a) Nominal
    (b) Ordinal
    (c) Interval
    (d) Ratio

14. **Which of the following is used to denote a continuous variable?** *[AIIMS May 2010]*
    (a) Simple bar
    (b) Histogram
    (c) Pie diagram
    (d) Multiple bar

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15. **Graph showing relation between 2 variables is:** *[DPG 2011]*
    (a) Scatter diagram
    (b) Frequency polygon
    (c) Picture chart
    (d) Histogram

16. **Trends can be best represented by:**
    (a) Scatter diagram *[Recent Question 2013]*
    (b) Bar diagram
    (c) Line diagram
    (d) Pie chart

17. **All of the following are example of nominal scale except:** *[Recent Question 2012]*
    (a) Race
    (b) Sex
    (c) Body weight
    (d) Socio-economic status

18. **Best way to plot the change of incidence of disease over time is:** *[Recent Question 2012]*
    (a) Histogram
    (b) Line chart
    (c) Scatter diagram
    (d) Ogive

19. **Best method to show trend of events with passage of time is:** *[DNB December 2010]*
    (a) Line diagram
    (b) Bar diagram
    (c) Histogram
    (d) Pie chart

20. **Graph to correlate two quantitative data is:**
    (a) Histogram *[DNB June 2009]*
    (b) Scatter diagram
    (c) Line diagram
    (d) Frequency curve

21. **Likert scale is:** *[DNB June 2011]*
    (a) Ordinal scale
    (b) Nominal scale
    (c) Variance scale
    (d) Categorical scale

22. **Nominal data example is** *[CGPG 2015]*
    (a) Types of hospitals
    (b) Severity of pain
    (c) Height
    (d) Grades of obesity

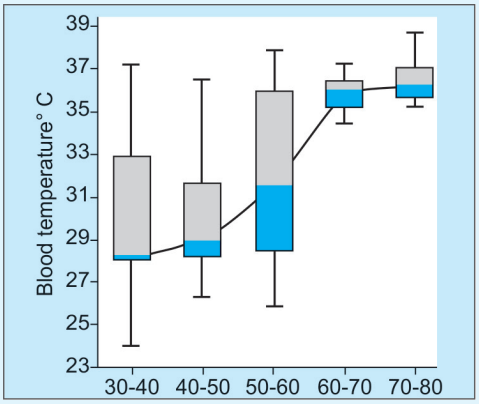
23. **A Doctor is taking history from a Diabetes patient and decides to make a chart to assess joint involvement. Which chart should he make?** *[AIIMS November 2015]*
    (a) Pie chart
    (b) Venn diagram
    (c) Histogram
    (d) Tree diagram

24. **Identify the Statistical diagram shown in Photograph** *[AIIMS November 2015]*

52	0
53	2 4
54	0 2 8
55	0 0 4 4 5 5 5 6 6 7 9
56	0 0 0 0 0 2 4 5 6 8 9 9
57	0 0 0 7 8 9
58	0 0 0 0 4 7
59	0 0 0 0
60	0 0 0 0 3 3 7 8
61	0 5

    (a) Funnel plot
    (b) Forest plot
    (c) Stem and Leaf plot
    (d) Box and Whisker plot

25. **Identify the Statistical diagram shown in Photograph** *[AIIMS November 2015] [Recent Question 2015]*



    (a) Funnel plot
    (b) Forest plot
    (c) Stem and Leaf plot
    (d) Box and Whisker plot

Review Questions

26. **Which of the following represent frequency of continuous variables?** *[AP 2006]*
    (a) Histogram
    (b) Line diagram
    (c) Simple bar chart
    (d) Component bar chart

27. **Frequency is represented as an area in continuous pattern in:** *[MP 2002]*
    (a) Bar diagram
    (b) Histogram
    (c) Pie diagram
    (d) Pictogram

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28. **Which type of variable "Social Class" is, if it has four categories-I to V and Class I is the highest social class and Class V is the lowest?** *[MP 2006]*
    (a) Dichotomous
    (b) Nominal
    (c) Ordinal
    (d) Interval

29. **Histogram is used as method of group presentation for:** *[MH 2003, Recent Question 2015]*
    (a) Qualitative data
    (b) Quantitative continuous data
    (c) Quantitative data- discrete type
    (d) Norminal data

MEASURES OF CENTRAL TENDECY

30. **Out of 11 births in a hospital, 5 babies weighed over 2.5 kg and 5 weighed less than 2.5 kg. What value do 2.5 represent?** *[AIPGME 2001]*
    (a) Geometric average
    (b) Arithmetic average
    (c) Median
    (d) Mode

31. **The number of malaria cases reported during the last 10 years in a town is given below, 250, 320, 190, 300, 5000, 100, 260, 350, 320, and 160 The epidemiologist wants to find out the average number of malaria cases reported in that town during the last 10 years. The most appropriate measure of average for this data will be:** *[AIIMS May 2001, AIIMS Nov 2004]*
    (a) Arithmetic mean
    (b) Mode
    (c) Median
    (d) Geometric mean

32. **The incidence of malaria in an area is 20, 20, 50, 56, 60, 5000, 678, 898, 345, 456. Which of these methods is the best to calculate the average incidence?** *[AIIMS Nov 01, June 2000]*
    (a) Arithmetic mean
    (b) Geometric mean
    (c) Median
    (d) Mode

33. **In a bimodal series, if mean is 2 and median is 3, what is the mode?** *[AIIMS June 1999]*
    (a) 5
    (b) 2.5
    (c) 4
    (d) 3

34. **Mean value of weight of a group of 10 boys was found to be 18.2 kg. Later it was found that weight of one of the boys was wrongly recorded as 2.0 kg that should have been 20 kg. The true mean weight of the group is:** *[AIPGME 1998]*
    (a) 18.2 kg
    (b) 20.2 kg
    (c) 16.4 kg
    (d) 20 kg

35. **If 60 values are arranged in ascending order, middle value is:** *[AIIMS Dec 1995]*
    (a) Arithmetic Mean
    (b) Median
    (c) 30th percentile
    (d) 31st percentile

36. **Central tendency is given by:** *[PGI Dec 01]*
    (a) Mean
    (b) Median
    (c) Moe
    (d) Variable
    (e) Variance

37. **Median is important for all *except*:** *[AIPGME 2012]*
    (a) Blood pressure
    (b) Survival time
    (c) Incubation period
    (d) Health expenses

38. **Which of the following statements is/ are correct about the distribution of weights of a group of students: 70, 70, 70, 75, 79, 83, 84, 85?** *[PGI May 2014]*
    (a) Mean 77
    (b) Median 77
    (c) Mode 70
    (d) Range 12
    (e) Normal distribution

39. **A smoker states that he has been smoking for 6 years. In the first year he was taking up to 5 sticks per day only. In the next 3 years he increased it to half pack per day. In the 5th year, his habits worsened to 1 pack per day. In the last year he stated that his daily sticks consumption is 2 packs per day. Select the correct statement Mean, median and mode of number of sticks are:** *[Recent Question 2014]*
    (a) 16,10, 15
    (b) 16, 10, 10
    (c) 10, 10, 15
    (d) 16, 10, 15

40. **In a survey of Sleep apnea scores among 10 persons, the highest value obtained of 58 was wrongly recorded as 85. This will affect the final results as** *[AIIMS PG May 2015]*
    (a) No change in Mean, Increased Median
    (b) Increased Mean, No change in median
    (c) Increased Mean, Increased Median
    (d) Increased Mean, Decreased Median

Review Questions

41. **Median of the following datas will be: 10, 9, 8, 8, 7** *[MP 2000]*
    (a) 8.75
    (b) 8
    (c) 9
    (d) 10

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42. Most frequently occurring value in a group of data:
(a) Mean *[MP 2002]*
(b) Mode *[Recent Question 2012]*
(c) Median
(d) Standard deviation

43. What is true among given data 20, 31, 31, 31, 25, 28, 35, 38, 31: *[MP 2004]*
(a) Mean is 31
(b) Range is 20-38
(c) Median is 15
(d) Mode is 15

44. Commonly used measures of central tendency are all of the following *except*: *[MP 2005]*
(a) Mean
(b) Median
(c) Mode
(d) Chi-square test

45. Values are arranged in ascending and descending order to calculate: *[RJ 2000]*
(a) Mean
(b) Mode
(c) Median
(d) S.D.

OTHER MEASURES OF LOCATION

46. 'Centile' divides data into: *[AIPGME 01]*
(a) 100 equal parts
(b) 4 equal parts
(c) 10 equal parts
(d) 20 equal parts

47. 50th percentile is equivalent to:
(a) Mean *[AIIMS Sep 1996]*
(b) Median
(c) Mode
(d) Range

48. A bacterium can divide every 20 minutes. Beginning with a single individual, how many bacteria will be there in the population if there is exponential growth for 3 hours? *[AIIMS May 05]*
(a) 18
(b) 440
(c) 512
(d) 1024

49. For a group of n = 250 subjects, 40th percentile would be the following value (after arranging in ascending order): *[AIPGME 2000]*
(a) 7th
(b) 40th
(c) 100th
(d) 140th

50. Central value of a set of 180 values can be obtained by:
(b) 90th percentile *[AIIMS Nov 2000]*
(a) 2nd tertile
(c) 9th decile
(d) 2nd quartile

51. A measure of location that divides the distribution in the ratio of 3:1 is: *[AIPGME 2003]*
(a) Median
(b) First quartile
(c) Third quartile
(d) Mode

52. Blood pressure data of 200 persons were collected. The first quartile BP of data was 94 mm Hg and third quartile was 110 mm Hg. How many patients lie between the 3rd and 4th quartile? *[AIIMS PG May 2015]*
(a) 25
(b) 50
(c) 100
(d) 200

53. A physician recorded Diastolic BP in 125 women aged 18-60 years and found the Mean to be 70 mm Hg with SD of 10 mm Hg. What will be the 5th Percentile value? *[AIIMS November 2015]*
(a) 40
(b) 53.6
(c) 67.5
(d) 89.4

VARIABILITY

54. Standard deviation is the measure of:
(a) Chance *[AIPGME 08]*
(b) Central tendency
(c) Deviation from mean value
(d) None

55. Median weight of 100 children was 12 kg. The standard deviation was 3. Calculate the percent coefficient of variance: *[AIIMS May 1994]*
(a) 25%
(b) 35%
(c) 45%
(d) 55%

56. While calculating the incubation period for measles in a group of 25 kids, standard deviation is 2 and the mean incubation period is 8 days, calculate standard error:
(a) 0.4 *[AIPGME 1993]*
(b) 1.0
(c) 2.0
(d) 0.5

57. Standard deviation of means measures:
(a) Non-sampling errors *[AIIMS May 01]*
(b) Sampling errors
(c) Random errors
(d) Conceptual errors

58. If the birth weight of each of the 10 babies born in a hospital in a day is found to be 2.8 kg, then the standard deviation of this sample will be:

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(a) 2.8 *[AIIMS May 2006, Dec 97, AIPGME 01]*
(b) 0 *[Recent Question 2013]*
(c) 1
(d) 0.28

59. Among a 100 women with average Hb of 10 gm%, the standard deviation was 1, what is the standard error?
(a) 0.01 *[AIIMS May 01, 04, 07]*
(b) 0.1
(c) 1
(d) 10

60. If each value of a given group of observations is multiplied by 10, the standard deviation of the resulting observations is: *[AIPGME 2004]*
(a) Original std. Deviation × 10
(b) Original std. Deviation/ l0
(c) Original std. Deviation – 10
(d) Original std. Deviation it self

61. The Hb level in healthy women has mean 13.5 g/dl and standard deviation 1.5 g/dl, what is the Z score for a woman with Hb level 15.0 g/dl: *[AIPGME 2005]*
(a) 9.0
(b) 10.0
(c) 2.0
(d) 1.0

62. In a sample of 100 pregnant females, Mean haemoglobin level estimated was 10 gm% with a Standard deviation of 1 gm%. What is the Standard error?
(a) 1 gm% *[AIPGME 2012]*
(b) 10 gm%
(c) 0.1 gm%
(d) 100 gm%

63. Following denotes measures of variability?
(a) Range *[PGI November 2011]*
(b) Mean deviation
(c) Standard deviation
(d) Median
(e) Mode

64. Most common deviation used in social medicine is:
(a) Mean *[Recent Question 2012]*
(b) Range
(c) Variance
(d) Standard deviation

65. In a population of 100 prevalence of candida glabrata was found to be 80%. If the investigator has to repeat the prevalence with 95% confidence what will the prevalence be? *[AIIMS PGMEE May 2013]*
(a) 78-82%
(b) 76-84%
(c) 72-88%
(d) 74-86%

66. How much population falls between median and median plus one standard deviation in a normal distribution? *[AIIMS PGMEE November 2013]*
(a) 0.34
(b) 0.68
(c) 0.17
(d) 0.47

67. There is a population of 20000 people with mean hemoglobin being 13.5 gm% having a normal distribution. What proportion of population constitutes proportion more than 13.5 gm%? *[AIIMS PGMEE November 2013]*
(a) 0.25
(b) 0.50
(c) 1
(d) 0.34

68. Measuring variation between two different units is done through: *[AIIMS November 2014]*
(a) Variance
(b) Coefficient of variation
(c) Standard deviation
(d) Range

69. True about Standard deviation is/are:
(a) 1 SD covers 95% values *[PGI November 2014]*
(b) Indicated distribution of variables
(c) Most common method used for dispersion
(d) Better indicator of variance than range
(e) Should be used only in normal distributions

Review Questions

70. Mean is 230 & SD = 10, then 95% confidence limits is:
(a) 210 - 250 *[Bihar 2003]*
(b) 250 - 290
(c) 290 - 330
(d) 330 - 370

71. Confidence limit in 2 S.D. is: *[UP 2002]*
(a) 66%
(b) 95%
(c) 98%
(d) 90%

72. Measures of dispersion all *except*: *[UP 2006]*
(a) Range *[UPSC CMS 2015]*
(b) Mean or average deviation
(c) Standard deviation
(d) Correlation and regression

73. Confidence limit is calculated by using: *[AP 2006]*
(a) Mean and standard error
(b) Mean and standard deviation
(c) Median and standard deviation
(d) Median

74. Z score criteria applicable to: *[Kolkata 2002]*
(a) Normal distribution *[Recent Question 2015]*
(b) Skewed deviation
(c) Chi-sqare test
(d) Paired't' test

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75. Correct relation between S = standard deviation & V = variance is: *[MH 2003]*
(a) V = square root of S
(b) S = square root of V
(c) V = 2S
(d) S = 2V

76. S.D. is 1.96, the confidence llmit is: *[RJ 2000]*
(a) 33.6%
(b) 66.6%
(c) 95%
(d) 99%

77. Square root of deviation is called: *[RJ 2000]*
(a) Standard deviation
(b) Standard error
(c) Mean deviation
(d) Range

78. Standard deviation does not depend on:
(a) Mean
(b) Median *[RJ 2001]*
(c) Range
(d) Sample size

79. Standard error of mean is called as: *[RJ 2001]*
(a) Standard deviation
(b) Mode
(c) Median
(d) Variable

DISTRIBUTIONS – NORMAL AND SKEWED

80. Which is the best distribution to study the daily admission of head injury patients in a trauma care centre?
(a) Normal distribution *[AIIMS May 2008]*
(b) Binomial distribution
(c) Uniform distribution
(d) Poisson distribution

81. The standard normal distribution:
(a) Is skewed to the left
(b) Has mean = 1.0 *[AIPGME 05, AIIMS Nov 99]*
(c) Has standard deviation = 0.0
(d) Has variance = 1.0

82. A normal distribution curve depends on: *[AIPGME 2000, AIIMS Feb 1997]*
(a) Mean and sample size
(b) Range and sample size
(c) Mean and standard deviation
(d) Mean and median

83. The fasting blood levels of glucose for a group of diabetics is found to be normally distributed with a mean of 105 mg per 100 ml of blood and a standard deviation of 10 mg per 100 ml of blood. From this data is can be inferred that approximately 95% of diabetics will have their fasting blood glucose levels within the limits of:
(a) 75 and 135 mg *[AIIMS Nov 2003]*
(b) 85 and 125 mg
(c) 95 and 115 mg
(d) 65 and 145 mg

84. In a group of 100 children, the mean weight of children is 15 kg. The standard deviation is 1.5 kg. Which one of the following is true? *[AIIMS May 2007]*
(a) 95% of all children weight between 12 and 18 kg
(b) 95% of all children weight between 13.5- and 16.5kg
(c) 99% of all children weight between 12 and 18 kg
(d) 99% of all children weight between 13.5 and 16.5kg

85. Which of the following statements is incorrect about standard normal distribution? *[AIIMS Dec 1997]*
(a) Shows a 'bath tub distribution'
(b) Has mean = 0.0
(c) Is bilaterally symmetrical bell shaped
(d) Has variance = 1.0

86. For a negatively skewed data mean will be:
(a) Less than median *[AIIMS May 02, 05]*
(b) More than median *[Recent Question 2013]*
(c) Equal to median
(d) One

87. The distribution of random blood glucose measurements from 50 first year medical students was found to have a mean of 3.0 mmol/litre with a standard deviation of 3.0 mmol/litre. Which of the following is a correct statement about the shape of the distribution of random blood glucose in these first year medical students? *[AIIMS Nov 2005]*
(a) Since both mean and standard deviation are equal, it should be a symmetric distribution
(b) The distribution is likely to be positively skewed
(c) The distribution is likely to be negatively skewed
(d) Nothing can be said conclusively

88. A chest physician observed that the distribution of forced expiratory volume (FEV) in 300 smokers had a median value of 2.5 litres with the first and third quartiles being 1.5 and 4.5 litres respectively. Based on this data how many persons in the sample are expected to have a FEV between 1.5 and 4.5 litres?
(a) 7.5
(b) 150 *[AIIMS Nov 05]*
(c) 225
(d) 300

89. If the distribution of intra-ocular pressure (IOP) seen in 100 glaucoma patients has an average 30 mm with a SD of 1.0, what is the lower limit of the average IOP that can be expected 95% of times?
(a) 28 *[AIIMS Nov 05, AIPGME 99]*
(b) 26
(c) 32
(d) 259

90. How much of the sample is included in 1.95 SD?
(a) 99% *[AIIMS May 1995, AIPGME 1997]*
(b) 95% *[JIPMER 2015]*
(c) 68%
(d) 65%

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91. If the systolic blood pressure in a population has a mean of 130 mmHg and a median of 140 mm Hg, the distribution is said to be: *[AIPGME 2004]*
(a) Symmetrical
(b) Positively skewed
(c) Negatively skewed
(d) Either positively or negatively skewed depending on the Standard deviation

92. For a given set of values, Mean = 20, Median = 24 & Mode = 26. The given distribution is: *[AIPGME 1998]*
(a) Symmetric
(b) Right-skewed
(c) Left-skewed
(d) Can be either symmetric or skewed

93. A population study showed a mean glucose of 86 mg/dL. In a sample of 100 showing normal curve distribution, what percentage of people have glucose above 86mg/ dL: *[AIIMS Dec 94, AIPGME 02]*
(a) 34
(b) 50
(c) NIL
(d) 68

94. Systolic blood pressure of a group of normal people between the age of 25-27 years was taken and a mean of 120 mm Hg was found. What will be the expected number of individuals among a group of 100 people taken for study whose systolic blood pressure will be below 120 mm Hg: *[AIIMS May 2001]*
(a) 25
(b) 50
(c) 75
(d) 100

95. The PEFR of a group of 11 year old girls follow a normal distribution with mean 300 l/min and standard deviation 20 l/min: *[AIPGME 05]*
(a) About 95% of the girls have PEFR between 260 and 340 l/min
(b) The girls have healthy lungs
(c) About 5% of girls have PEFR below 260 l/min
(d) All the PEFR must be less than 340 l/min

96. In normal curve: *[Karnataka 2006]*
(a) Mean = 2 standard: deviation
(b) Mean = Median
(c) Mean = Variance
(d) Mean = 1 standard deviation

97. Normal distribution curve: *[PGI June 08]*
(a) Mean, median, mode are same
(b) B/L symmetrical
(c) bell shape
(d) SD is zero
(e) Mean is one

98. Regarding the normal curve, which of the following statements is true: *[PGI Dec 01]*
(a) Both limbs of the curve touch the baseline
(b) The curve is bilaterally symmetrical
(c) There is a skew to the right
(d) There is a skew to the left
(e) Mean, median and mode coincide

99. 'Z score' is for which type of distribution?
(a) Normal *[AIPGME 2010]*
(b) Binomial
(c) t
(d) Chi- square

100. Pearson's Skewness Coefficient is given by:
(a) Mean-Mode/SD *[AIPGME 2011]*
(b) Mode-Mean/SD
(c) SD/Mean-Median
(d) SD/Median-Mean

101. Mean value of marks in a distribution of 100 students in a class is 105 and Standard deviation is 10. How many students will have their marks in the range 85-125?
(a) 50% *[AIPGME 2012]*
(b) 68%
(c) 95%
(d) 99.7%

102. Q-test is used for detecting:
(a) Outliers *[AIIMS PGMEE November 2013]*
(b) Interquartile range
(c) Difference of means
(d) Difference of proportions

103. When the variables follow standard distribution:
(a) Mean = median *[DNB 2008]*
(b) Median = variance
(c) Mean = 2 median
(d) Standard deviation = 2 variance

104. In a left skewed curve, true statement is:
(a) Mean = Median *[DNB June 2011]*
(b) Mean < Mode
(c) Mean >Mode
(d) Mean = Mode

105. Mean hemoglobin of a group of pregnant females is found to be 10.6 gm/dL with Standard deviation of 2 gm/dL. 5% pregnant females in this group will have their hemoglobin level below: *[AIIMS May 2014]*
(a) 8.6 gm/dL
(b) 7.31 gm/dL
(c) 6.6 gm/dL
(d) 5.0 gm/dL

106. A researcher has selected all possible samples from a population and plotted the Mean of each sample on a linear graph. It is a type of *[AIIMS November 2015]*
(a) Population distribution
(b) Parametric distribution
(c) Sample distribution
(d) Sampling distribution

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Review Questions

107. In a standard normal curve, the area between one standard deviation on either side will be: *[DNB 2000]*
(a) 68%
(b) 85%
(c) 99.7%
(d) None of the above

108. In a standard normal curve, mean + 2 standard deviations covers: *[DNB 2000]*
(a) 60%
(b) 65%
(c) 95%
(d) 99%

109. When the variables follow standard distribution?
(a) Mean = median *[DNB 2008]*
(b) Median = variance
(c) Mean = 2 median
(d) Standard deviation = 2 variance

110. About standard Normal curve all is true *except*:
(a) Area = 1 *[Bihar 2005]*
(b) S.D. = 1 *[Recent Question 2012]*
(c) Bell shaped
(d) Mean and Median = 1

111. Area covered between two standard deviation in a normal distribution curve: *[Kolkata 2004]*
(a) 68%
(b) 95.4%
(c) 99.6%
(d) 100%

112. Normal distribution curve is determined by:
(a) Standard deviation and mean
(b) Standard deviation and mode
(c) Mode and median *[Rajasthan 2002] [MH 2006]*
(d) Standard deviation and median

SAMPLING

113. For calculation of sample size for a prevalence study all of the following are necessary *except*:
(a) Prevalence of disease in population
(b) Power of the study *[AIPGME 03]*
(c) Significance level
(d) Desired precision

114. In the WHO recommended EPI Cluster sampling for assessing primary immunization coverage, the age group of children to be surveyed is:
(a) 0-12 months *[AIIMS Nov 2005]*
(b) 6-12 months
(c) 9-12 months
(d) 12-23 months

115. In the WHO recommended EPI cluster sampling for assessing primary immunization coverage, the age group of children to be surveyed is:
(a) 0-12 months *[AIIMS Nov 1992, & 2008]*
(b) 6-12 months
(c) 9-12 months
(d) 12-23 months

116. Sampling method used in assessing immunization status of children under immunization program is:
(a) Systematic sampling *[AIIMS May 2004, AIPGME 07]*
(b) Stratified sampling
(c) Group sampling
(d) Cluster sampling

117. Following are the sampling techniques used to conduct community health surveys, *except*:
(a) Simple random *[AIIMS May 1994]*
(b) Systematic random
(c) Stratified random
(d) Cluster testing

118. The number of patients required in a clinical trial to treat a specify disease increases as: *[AIPGME 05, AIIMS Nov 02]*
(a) The incidence of the disease decreases
(b) The significance level increases
(c) The size of the expected treatment effect increased
(d) The drop-out rate increases

119. In a study, people are separated into certain sub-groups and then some are selected randomly from each of these sub-groups. What type of sampling is being done?
(a) Simple random sampling *[AIPGME 2011]*
(b) Cluster random sampling
(c) Systematic random sampling
(d) Stratified random sampling

120. True about cluster sampling all *except*:
(a) Sample size same as simple random
(b) It is two stage sampling *[AIIMS May 2011]*
(c) Cheaper than other methods
(d) It is a method for rapid assessment

121. For which of the following sampling, a Design effect is used? *[AIPGME 2012]*
(a) Simple random sampling
(b) Systematic random sampling
(c) Stratified random sampling
(d) Cluster random sampling

122. 50% population having disease with estimated prevalence to be 45-55% with 95% of probability of identifying them minimum sample size required is:
(a) 100 *[AIIMS PGMEE May 2013]*
(b) 200
(c) 300
(d) 400

123. Simple random sampling is ideal for:
(a) Vaccinated people *[DNB December 2010]*
(b) Heterogenous population
(c) Homogenous population
(d) All of the above

124. Stratified sampling is ideal for: *[Recent Question 2012]*
(a) Heterogenous data
(b) Homogenous data
(c) Both
(d) None

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125. **Children surveyed in cluster sampling for coverage of national immunization programme in:** *[DNB June 2011]*
(a) 30 cluster of 5 children
(b) 20 cluster of 5 children
(c) 30 cluster of 10 children
(d) 30 cluster of 7 children

126. **In a study first schools are sampled, then sections, and finally students. This type of sampling is known as:** *[AIIMS PGMEE November 2012]*
(a) Stratified sampling
(b) Simple random sampling
(c) Cluster sampling
(d) Multistage sampling

127. **When number of observations is 25, the number of class intervals must be:** *[NUPGET 2013]*
(a) 25
(b) 15
(c) 10
(d) 5

128. **All of following comes under random sampling method except:** *[DNB December 2011]*
(a) Quota sampling
(b) Simple random sampling
(c) Stratified sampling
(d) Cluster sampling

129. **For an epidemiological study, every 10th person is selected from a population. This type of sampling is known as:** *[AIIMS November 2014]*
(a) Simple random sampling
(b) Stratified random sampling
(c) Systematic random sampling
(d) Cluster random sampling

Review Questions

130. **Simple random sampling:** *[AP 2006]*
(a) Provides least number of possible samples
(b) Equal chance to each for collection of certain number for a sample
(c) Picking every 5th or 10th at regular intervals
(d) Sample represent, a corresponding strata of universe

131. **In maternal and child welfare program the sampling is done by which method?** *[MH 2000]*
(a) Systematic
(b) Stratified
(c) Group
(d) Cluster-30

PROBABILITY AND ODDS

132. **You have diagnosed a patient clinically as having SLE and ordered 6 tests. Out of which 4 tests have come positive and 2 are negative. To determine the probability of SLE at this point, you need to know:** *[AIPGME 05, AIIMS May 2006] [AIPGME 2007]*
(a) Prior probability of SLE; sensitivity and specificity of each test
(b) Incidence of SLE and predictive value of each test
(c) Incidence and prevalence of SLE
(d) Relative risk of SLE in this patient

133. **If prevalence of diabetes is 10%, the probability that three people selected at random from the population will have diabetes is:** *[AIPGME 04]*
(a) 0.01
(b) 0.03
(c) 0.001
(d) 0.003

134. **Chance of passing a Genetic disease "y" trait by the affected parents to children is 0.16. They plan to have two children. Probability of both the children having "y" trait is:** *[AIIMS Dec 1994]*
(a) Zero
(b) 0.16
(c) 0.32
(d) 0.0256

135. **For Mrs Rekha, probability of having a baby of BW < 2500 gms is 0.50 and of having a BW 2500-2999 gms is 0.20. So the probability for Mrs. Rekha to have a baby of BW < 3 kg is:** *[AIPGME 05]*
(a) 0.30
(b) 0.70
(c) 0.10
(d) 1.0

136. **Probability of Mr. Ram developing Acute MI in his lifetime is 0.75. What are his Odds of developing Acute MI in his lifetime?** *[AIPGME 04]*
(a) 3:4
(b) 3:1
(c) 4:3
(d) 1:3

137. **The events A and B are mutually exclusive, so:**
(a) Prob (A or B) = Prob (A) + Prob (B)
(b) Prob (A and B) = Prob (A) X Prob (B)
(c) Prob A) = Prob (B) *[AIPGME 05]*
(d) Prob A) + Prob (B) = 1

Review Questions

138. **There were 50 patients in a ward 20 girls and 30 boys of them 10 girls and 20 boys required surgery. What is the probability of each patient being selected correctly for surgery:** *[DNB 2008]*
(a) 2/6
(b) 3/5
(c) 6/25
(d) 1/6

139. **What is the probability that confounding factor fall to the right of 95%:** *[UP 2004]*
(a) 1 in 5
(b) 1 in 10
(c) 1 in 15
(d) 1 in 20

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STATISTICAL TESTS

140. In a study, variation in cholesterol was seen before and after giving a drug. The test which would give its significance is *[AIPGME 01, 02, 07]*
(a) Unpaired t-test
(b) Fischer test
(c) Paired t-test
(d) Chi-square test

141. Square root of p1q1/n1 + p2q2/n2 is a measure of:
(a) Mean *[AIIMS Dec 1995]*
(b) Standard error of difference between two means
(c) Standard error of difference between two proportions
(d) Normal deviate

142. A cardiologist waewnts to study the effect of an atrovastatin drug. He notes down the initial cholesterol levels of 50 patients and then administers the drug on them. After a month's treatment, he measures the cholesterol level again. Which of the following is the most appropriate to test the statistical significance of the change in blood cholesterol? *[AIPGME 02]*
(a) Paired t-test
(b) Unpaired or independent t-test
(c) Analysis of variance
(d) Chi-square test

143. A chi-square test would be most appropriate for testing which one of the following hypotheses? *[AIPGME 2000]*
(a) That the mean AIPGE score of Delhi students is greater than that of mumbai students
(b) That a smaller proportion of people who were immunized against chickenpox subsequently develop zoster than those who were not immunized
(c) That the mean blood pressure of black and white male-hypertensive patients taking ACE inhibitors is the same as that of black and white female-hypertensive patients taking ACE inhibitors and that of black and white males and females taking diuretics and placebos
(d) That the mean cost of treating a patient with coronary artery disease with angioplasty is greater than the mean cost of providing medical treatment

144. In a particular trial, the association of lung cancer with smoking is found to be 40% in one sample and 60% in another. What is the best test to compare the results?
(a) Chi-square test *[AIIMS May 2001]*
(b) Fischer test
(c) Paired t test
(d) ANOVA test

145. Height of group of 20 Boys aged 10 years was 140 + 13 cm & 20 girl of same age was 135 cm ± 7cm to test the statistical significance of difference in height, test applicable is: *[AIIMS Nov 05]*
(a) X^2 (b) Z
(c) t (d) F

146. The mean B.P. of a group of persons was determined and after an interventional trial, the mean BP was estimated again. The best test to be applied to determine the significance of intervention is:
(a) Chi-square *[AIIMS Dec 1997]*
(b) Paired 't' test
(c) Correlation coefficient
(d) t-test

147. An investigator wants to study the association between maternal intake of iron supplements (Yes or No) and incidence of low birth weight (< 2500 or > 2500) gm). He collects relevant data from 100 pregnant women as to the status of usage of iron supplements and the status of low birth weight in their newborns. The appropriate statistical test of hypothesis advised in this situation is:
(a) Paired-t-test *[AIIMS Nov 03]*
(b) Unpaired or independent t-test
(c) Analysis of variance
(d) Chi-Square test

148. While applying chi-square test to a contingency table of 4 rows and 4 columns, the degrees of freedom would be: *[AIPGME 1995]*
(a) 1 (b) 4
(c) 9 (d) 8

149. In a 3 x 4 contingency tables, the number of degrees of freedom equals to: *[AIIMS Nov 2004]*
(a) 1
(b) 5
(c) 6
(d) 12

150. A cardiologist wants to study the effect of an antihypertensive drug. He notes down the initial systolic blood pressure (mmHg) of 50 patients and then administers the drug on them. After a week's treatment, he measures the following is the most appropriate statistical test of significance to test the statistical significance of the change in blood pressure: *[AIIMS June 1997, AIIMS May 1995, AIIMS Nov 2004]*
(a) Paired t-test
(b) Unpaired or independent t-test
(c) Analysis of variance
(d) Chi-square test

151. A study was undertaken to assess the effect of a drug in lowering serum cholesterol levels. 15 obese women and 10 non-obese women formed the 2 limbs of the study. Which test would be useful to correlate the results obtained?
(a) ANOVA test *[AIIMS Nov 01]*
(b) Student's t-test
(c) Chi-square test
(d) Fischer test

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152. In a particular trial, the association of lung cancer with smoking is found to be 40% in one sample and 60% in another. What is the best test to compare the results? *[AIPGME 03]*
(a) Chi-square test
(b) Fischer test
(c) Paired t test
(d) ANOVA test

153. Not required for Chi-square test is: *[AIIMS Dec 1997]*
(a) Mean & SD of the groups
(b) Each expected cell frequency > 5
(c) Large sample
(d) Contingency table

154. Appropriate statistical method to compare two means is: *[AIPGME 2000]* *[Recent Question 2013]*
(a) Chi-square test
(b) Student's t-test
(c) Odds ratio
(d) Correlation coefficient

155. Appropriate statistical method to compare two proportions is: *[AIPGME 1995]*
(a) Chi-square test
(b) Student's t-test
(c) Odds ratio
(d) Correlation coefficient

156. In a given data, degree of freedom will be: *[AIIMS May 06]*

Duration of developing AIDS	Blood group			
	A	B	AB	O
0 – 5 years	20	30	48	7
5 – 10 years	110	12	37	12
10 – 15 years	12	9	8	3

(a) 12
(b) 6
(c) 9
(d) 20

157. For testing the statistical significance of the difference in heights of school children:
(a) Student's 't' test *[AIIMS May 2003]*
(b) Chi-squared test
(c) Paired 't' test
(d) One way analysis of variance (one way ANOVA)

158. Not true about Chi-square test is: *[AIPGME 03, AIIMS June 99]*
(a) Tests the significance of difference between two proportions
(b) Tells about presence or absence of an association between two variables
(c) Directly measures the strength of association
(d) Can be used when more than two groups are to be compared

159. Mean bone density amongst 2 group of 50 people each is compared, which would be the best test?
(a) Chi-square *[AIIMS May 2008]*
(b) Student t test
(c) Mc nemar chi square test
(d) Fischer test

160. An antihypertensive drug is studied before and after using it for treatment of a patient, what is this study:
(a) Chi-square test *[PGI Dec 2K]*
(b) Paired 't' test
(c) Student 't' test
(d) Regression
(e) Co-relation

161. What will be the degree of freedom in no. of row 3 and col. 4: *[PGI Dec 2002]*
(a) 3
(b) 6
(c) 4
(d) 9
(e) 10

162. An investigator finds out that 5 independent factors influence the occurrence of a disease. Comparison of multiple factors that are responsible for the disease can be assessed by: *[AIIMS May 2011]*
(a) ANOVA
(b) Multiple linear regression
(c) Chi-square test
(d) Multiple logistic regression

163. Mean blood alcohol levels are measured in patients before and after using an interventional drug. The statistical test of significance to be applied is:
(a) Chi-square test *[AIPGME 2012]*
(b) ANOVA
(c) Paired students t-test
(d) Unpaired students t-test

164. Tests of Significance include all *except*: *[JIPMER 2014]*
(a) t
(b) Z
(c) SD
(d) Chi-square

165. In a study, Two groups of newborns are checked for their weights based on whether mothers received food supplements or not. Appropriate statistical test that can be used is *[AIIMS PG May 2015]*
(a) Paired t test
(b) Unpaired t test
(c) Fischer's exact test
(d) Chi-square test

Review Questions

166. Chi-square test is used to measure the degree of: *[Bihar 2004]*
(a) Significance of difference between two proportions
(b) Association between two variables

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(c) Correlation between two variables
(d) Agreement between two observations

167. True regarding Chi-square test is: *[UP 2000]*
(a) Measure the significance of difference between two proportion
(b) Null hypothesis is equal
(c) Does not test the significance
(d) Tests correlation and regression

168. In a table of 2 × 2, the degree of freedom is:
(a) 4 *[UP 2001]*
(b) 1
(c) 8
(d) 7

169. 1 degree of freedom in chi-square test, the value of x^2 for a probability of 0.05 is: *[UP 2007]*
(a) 0.45
(b) 2.41
(c) 3.84
(d) 4.34

170. Test of association between two qualitative variables is done by:
(a) Chi-square test *[AP 2004]*
(b) Correlation
(c) Regression
(d) None

171. About chi-square test, true is: *[MP 2000]*
(a) <0.001 is statistically significant
(b) Less no. of samples are associated with less error
(c) Categories of data used in test need not be mutually exclusive and discrete
(d) Tests correlation and regression

172. A study who planned to find out the effect of iron supplementation during pregnancy on the birth weight of new born children. Two groups, one with iron supplementation and the other without iron supplementation during pregnancy were compared. Birth weight of new borns were recorded as means + SD. Which significant test (statistical) is appropriate for comparison of birth weights between the two groups? *[MP 2008]*
(a) Unpaired 't' test
(b) Paired 't' test
(c) Mcnemae's chi-square test
(d) Chi-square test

173. A study measures a patient's serum cholesterol before and after a new lipid-lowering therapy has been gives. What type of significance test should be used to analyze the data? *[MH 2007]*
(a) Paired t-test
(b) Student's t-test
(c) Chi-squared test
(d) Pearson's test

174. What would be degree of freedom if 5 row and 6 column: *[RJ 2009]*
(a) 30
(b) 20
(c) 40
(d) 25

175. Chi square test 5 rows/4 columns, degree of freedom is:
(a) 9 *[Recent Question 2012] [Recent Question 2013]*
(b) 12
(c) 16
(d) 20

176. ANOVA is used: *[Recent Question 2012]*
(a) To compare means in 2 groups
(b) To compare means in 3 or more groups
(c) To compare means in 1 group before and after intervention
(d) To find correlation

177. Not required for chi-square test: *[Recent Question 2012]*
(a) Null hypothesis
(b) Degrees of freedom
(c) Means in different groups
(d) Proportions in different groups

178. Chi-square test is for: *[DNB December 2010]*
(a) Standard error of mean
(b) Standard error of proportion
(c) Standard error of difference between 2 means
(d) Standard error of difference between proportions

179. Degree of freedom for 2 X 2 contingency table is:
(a) 1 *[DNB June 2011]*
(b) Zero
(c) 2
(d) 4

180. Degree of freedom of a chi square test in contingency table of 2 by 3 is: *[DNB December 2009]*
(a) 1.0
(b) Zero
(c) 2
(d) 4

181. Degree of freedom for a contingency table with 3 rows and 6 columns is: *[Recent Question 2012]*
(a) 2
(b) 3
(c) 10
(d) 18

182. Test is used to compare Kaplan-meier survival curve:
(a) ANOVA *[Recent Question 2012]*
(b) Bland altmann analysis
(c) Chi-square test
(d) Cox proportional hazards test

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183. Test(s) used to compare two proportions is/are: *[PGI November 2013]*
(a) Paired t-test
(b) Unpaired t-test
(c) ANOVA
(d) Fischer's exact test
(e) Chi-square test

CORRELATION AND REGRESSION

184. The correlation between variables A and B in a study was found to be 1.1. This indicates: *[AIPGME 02]*
(a) Very strong correlation
(b) Moderately strong correlation
(c) Weak correlation
(d) Computational mistake in calculating correlation

185. A lecturer states that the correlation coefficient between prefrontal blood flow under cognitive load and the severity of psychotic symptoms in schizophrenic patients is – 1.24. You can therefore conclude that: *[AIIMS June 2000]*
(a) Pre-frontal blood flow under cognitive load is a good predictor of the severity of psychotic symptoms in schizophrenic patients
(b) Prefrontal blood flow under cognitive load accounts for a large proportion of the variance in psychotic symptoms in schizophrenic patients
(c) Psychosis or schizophrenia is in some way a cause or partial cause of low prefrontal blood flow under cognitive load
(d) The lecturer has reported the correlation coefficient incorrectly

186. A cardiologist found a highly significant correlation coefficient (r = 0.90, p= 0.01) between the systolic blood pressure values and serum cholesterol values of the patients attending his clinic. Which of the following statements is a wrong interpretation of the correlation coefficient observed? *[AIPGME 05]*
(a) Since there is a high correlation, the magnitudes of both the measurements are likely to be close to each other
(b) A patient with a high level of systolic BP is also likely to have a high level of serum cholesterol
(c) A patient with a low level of systolic BP is also likely to have a low level of serum cholesterol
(d) About 80% of the variation in systolic blood pressure among his patients can be explained by their serum cholesterol values and vice a versa

187. Which of the following is not true about 'correlation'? *[AIIMS June 97]*
(a) It indicates degree of association between two characteristics
(b) Correlation coefficient of 1 means that the two variables exhibit linear relationship
(c) Correlation can measure risk
(d) Causation implies correlation

188. Best way to study relationship between two variables is: *[AIPGME 02]*
(a) Bar chart
(b) Scatter diagram
(c) Histogram
(d) Pie chart

189. If we know the value of one variable in an individual & wish to know the value of another variable, we calculate: *[AIIMS June 1997]*
(a) Coefficient of correlation
(b) Coefficient of regression
(c) SE of mean
(d) Geometric mean

190. If the correlation of height with age is given by the equation y=a + biopsy, what would be the nature of the graph? *[AIPGME 05]*
(a) Straight line
(b) Parabola
(c) Hyperbola
(d) Sigmoid curve

191. What can be true regarding the coefficient of correlation between IMR and economic status?
(a) r = + 1 *[AIIMS May 2001]*
(b) r = – 1
(c) r = + 0.22
(d) r = – 0.8

192. The Correlation Coefficient between Smoking & Lung Cancer was found to be 1.4. This indicates:
(a) Weak correlation *[AIIMS Feb 1997]*
(b) Moderate correlation
(c) Strong correlation
(d) Mistake in calculation

193. Study finds a correlation coefficient of + 0.7 between self reported work satisfaction & expectancy of life in a random sample of 5000 corporate workers. (p = 0.01). This means that: *[AIIMS Dec 1997]*
(a) Work satisfaction improves life expectancy
(b) Strong statistically significant (+) association between work satisfaction and life expectancy
(c) 70% people who enjoy work shall live longer
(d) 70% association between work satisfaction & life expectancy

194. Total Cholesterol level = a + b (calorie intake) + c (physical activity) + d (body mass index); is an example of:
(a) Simple linear regression *[AIPGME 05]*
(b) Simple curvilinear regression
(c) Multiple linear regression
(d) Multiple logistic regression

195. A coefficient of correlation value of "r = +0.8" indicates *[Karnataka 2005]*
(a) Strong direct relationship between two variables
(b) Strong inverse relationship between two variables
(c) Insignificant association between two variables
(d) One variable is the cause of the other variable

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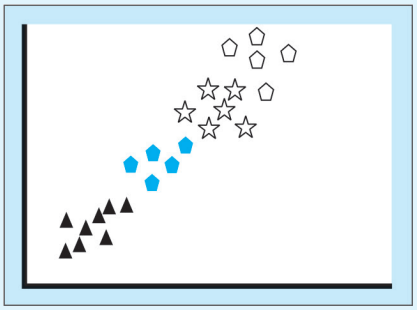
196. Correlation in height & weight are measured by:
(a) Coefficient of variation *[Recent Question 2013]*
(b) Range of variation
(c) Correlation coefficient
(d) None

197. Mosquitoes decrease as height increases in:
(a) Positive correlation *[Recent Question 2013]*
(b) Negative correlation
(c) Bidirectional
(d) Zero correlation

198. Strong correlation is signified by a correlation coefficient of: *[DNB June 2011]*
(a) Zero
(b) 1
(c) Less than 1
(d) More than 1

199. Four populations had Correlation coefficients of + 0.6 each for Weight and Height when plotted together. What would be Net coefficient of correlation? *[AIIMS November 2015]*



(a) Same
(b) Smaller
(c) Greater
(d) Cannot be predicted

Review Questions

200. If R=2.86, it means: *[Kolkata 2009]*
(a) positive correlation
(b) negative correlation
(c) no correlation
(d) it is a wrong statement

201. Correlation co-efficient varies between:
(a) 0 to + 1 *[MP 2000]*
(b) -1 to 0
(c) -1 to + 1
(d) + 1 to +2

ERRORS AND P- VALUE

202. Type I sampling error is classified as:
(a) Alpha error *[AIPGME 01]*
(b) Beta error
(c) Gamma error
(d) Delta error

203. The "P" value of a randomized controlled trial comparing operation A (new procedure) & Operation B (Gold standard) is 0.04. From this, we conclude that:
(a) Type II error is small & we can accept the findings of the study *[AIPGME 2003]*
(b) The probability of false negative conclusion that operation A is better than operation B, when in truth it is not, is 4%
(c) The power of study to detect a difference between peration A & B is 96%
(d) The probability of a false positive conclusion that operation 'Operation A is better that Operation B', when in truth it is not, is 4%

204. Power of study can be increased by:
(a) Increasing a error *[AIPGME 2002]*
(b) Decreasing b error *[AIIMS May 2014]*
(c) Decreasing a error
(d) Increasing b error

205. In assessing the association between maternal nutritional status and the birth weight of the newborns, two investigators A and B studied separately and found significant results with p values 0.02 and 0.04 respectively. From this information, what can you infer about the magnitudes of association found by the two investigations? *[AIIMS Nov 2004]*
(a) The magnitude of association found by investigator A is more than that found by B
(b) The magnitude of association found by investigator B is more than that found by A
(c) The estimates of association obtained by A and B will be equal, since both are significant
(d) Nothing can be concluded as the information given is inadequate

206. A randomized trial comparing efficacy of two regimens showed that difference is statistically significant with p<0.001 but in reality the two drugs do not differ in their efficacy. This is an example of:
(a) Type-I error (a error) *[AIIMS May 2006]*
(b) Type – II error (b error)
(c) 1-a
(d) 1-b

207. After applying a statistical test, an investigator gets the 'P value' as 0.01. it means that: *[AIIMS Nov 2003, AIIMS May 05, 08]*
(a) The probability of finding a significant difference is 1%
(b) The probability of declaring a significant difference is 1%
(c) The difference is not significant 1% times and significant 99% times
(d) The power of the test used is 99%

208. All are true about P-value except: *[AIPGME 03]*
(a) Is the probability of committing Type-I error
(b) Is equal to 1-b

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(c) Is the chance that the presence of difference is concluded when actually there is none
(d) When P-value is less than a, the result is statistically significant

209. All are true *except*: *[AIIMS May 04]*
(a) Alpha is the maximum tolerable probability of type-I error
(b) Beta is the probability of type-II error
(c) When Null Hypothesis is true but is rejected, it is Type-II error
(d) P-value can be more or less than a

210. Statistical Power of a trial is equal to:
(a) $1 + \alpha$
(b) $1 - \beta$ *[AIIMS Nov 04]*
(c) $\alpha + \beta$
(d) α / β

211. P-value is the probability of: *[AIIMS June 2000]*
(a) Not rejecting a null hypothesis when true
(b) Rejecting a null hypothesis when true
(c) Not rejecting a null hypothesis when false
(d) Rejecting a null hypothesis when false

212. An investigator wants to study the association between maternal intake of iron supplements (Yes/ No) and birth weights (in gms) of newborn babies. He collects relevant data from 100 pregnant women and their newborns. What statistical test of hypothesis would you advise for the investigator in this situation?
(a) Chi-square test *[AIIMS May 03]*
(b) Unpaired or independent t-test
(c) Analysis of Variance
(d) Paired t-test

213. A randomized trial comparing the efficacy of two drugs showed a difference between the two with a p value of <0.005. In reality, however the two drugs do not differ. This therefore is an example of:
(a) Type I error (alpha error) *[AIIMS Nov 02]*
(b) Type II error (beta error)
(c) $1 - \alpha$ (alpha)
(d) $1 - \beta$

214. The risk factor association of smoking with pancreatic cancer was studied in a case control study.The values are:

Group	Odds ratio	95% Confidence limits
A	2.5	1.0 – 3.1
B	1.4	1.1 – 1.7
C	1.6	0.9 – 1.7

Which of the following is correct *[AIIMS Nov 09]*
(a) Risk is more associated with Group A
(b) Risk is more associated with Group B
(c) Risk is more associated with Group C
(d) Risk is equally associated with all three groups

215. All of the following are true about Standard error *except*? *[AIIMS Nov. 09]*
(a) As the sample size increases, Standard error will also increase
(b) Based on Normal distribution
(c) It depends on Standard deviation of mean
(d) Is used to estimate confidence limit

216. P-value is defined as: *[AIPGME 2012]*
(a) Probability of declaring a significant difference when actually it is not present
(b) Probability of declaring a significant difference when actually it is present
(c) Probability of not declaring a significant difference when actually it is not present
(d) Probability of not declaring a significant difference when actually it is present

217. Rejecting a null hypothesis when it is true is called as:
(a) Type 1 error *[DNB December 2010]*
(b) Type 2 error
(c) Type 3 error
(d) Type 4 error

218. When we say that "the difference is significant", it means that: *[Recent Question 2012]*
(a) It is likely by chance and when P> 0.0.5
(b) It is unlikely by chance and when P > 0.05
(c) It is unlikely by chance and when P < 0.05
(d) It is likely by chance and when P < 0.05

219. Type I Statistical error occurs if *[JIPMER 2015]*
(a) Null hypothesis is true but rejected
(b) Null hypothesis is true and accepted
(c) Null hypothesis is false but accepted
(d) Null hypothesis is false and rejected

Review Questions

220. P value significant indicates: *[UP 2003]*
(a) Probability of Type I Error is < 0.05
(b) Probability null hypothesis is correct
(c) Probability null hypothesis is false
(d) To find out meaning of regression

221. In a test of significance, P value is 0.023 the observed difference in study can be considered as: *[MH 2005]*
(a) Null hypothesis accepted and the study is rejected
(b) Null hypothesis rejected and the study is accepted
(c) Null hypothesis accepted and the study is accepted
(d) Null hypothesis rejected and the study is also rejected

MISCELLANEOUS

222. Which is the best method to compare the results obtained by a new test and a gold standard test?
(a) Correlation study *[AIIMS May 07]*
(b) Regression study
(c) Bland and Altman analysis
(d) Kolmogorov-Smirnov test

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223. The parameters of sensitivity and specificity are used for assessing: *[AIPGME 03]*
(a) Criterion validity
(b) Construct validity
(c) Discriminant validity
(d) Content validity

224. Which of the following statements about Delphi method is true? *[AIPGME 2008]*
(a) Method involves formation of a team to undertake and monitor a Delphi on a given subject
(b) Selection of one or more panels to participate in the exercise. Customarily, the panelists are experts in the area to be investigated
(c) The first round in Delphi method involves development of a questionnnaire
(d) All are true

225. A researcher draws unbiased sample of 100 adult delhites and finds that their mean weight is 72 kg with a standard deviation of 1.5. 95% of wt of delhites shall between: *[AIPGME 1996]*
(a) 66 and 78 kg
(b) 69 and 75 kg
(c) 70.5 and 73.5 kg
(d) None of the above

226. In a drug trial A 50 yr old patient with CAD is being interviewed about his dietary & smoking habits. The possible bias that might be introduced might be:
(a) Selection bias *[AIIMS Feb 1997]*
(b) Berkesonian bias
(c) Recall bias
(d) No possibility of bias

227. Pearson or spearman coefficient is used for evaluation of: *[AIIMS Nov 04]*
(a) Differences in proportion
(b) Comparison of more than 2 means
(c) Comparison of variance
(d) Correlation

228. LJ chart is used for: *[AIIMS May 07]*
(a) Accuracy
(b) Precision
(c) Odds
(d) Likelihood ratio

229. What is NOT true about a case control study?
(a) Gives attributable risk *[AIPGME 06]*
(b) Is less expensive
(c) Involves fewer subjects
(d) Provides quick results

230. If a biochemical test gives the same reading for a sample on repeated testing, it is inferred that the measurement is: *[AIIMS June 1992]*
(a) Precise
(b) Accurate
(c) Specific
(d) Sensitive

231. Mean, Median and Mode are:
(a) Measures of dispersion *[AIIMS Dec 94, & Nov 2007]*
(b) Measures association between two variables
(c) Test of significance
(d) Measures of central tendency

232. If a 95% Confidence Interval for prevalence of Cancer in Smokers aged >65 years is 56% to 76%, the chance that the prevalence could be less than 56% is:
(a) Practically NIL *[AIIMS May 07]*
(b) 44%
(c) 2.5%
(d) 5%

233. A test which produces similar results when repeated, but values obtained are not close to actual/true value, is: *[AIIMS Nov 02]*
(a) Precise but inaccurate
(b) Precise and accurate
(c) Imprecise and accurate
(d) Imprecise and inaccurate

234. Receiver Operator Characteristic (ROC) curve is usually drawn between: *[AIPGME 06]*
(a) Sensitivity & Specificity
(b) (1 – Sensitivity) & Specificity
(c) Sensitivity & (1 – Specificity)
(d) (1 – Sensitivity) & (1 – Specificity)

235. Sensitivity of a screening test 'X' is 90 % while its specificity is 10 %. Likelihood ratio for a positive test is:
(a) 9.0 *[AIIMS May 07]*
(b) 8.0
(c) 1.0
(d) 0.1

236. When a diagnostic test is used in "series" mode, then: *[AIPGME 01, 02, AIIMS Nov 02]*
(a) Sensitivity increases but specificity decreases
(b) Specificity increases but sensitivity decreases
(c) Both sensitivity and specificity increase
(d) Both sensitivity and specificity decrease

237. Mean, Medium and Mode are: *[Karnataka 2004]*
(a) Measure of dispersion
(b) Measure association between two variables
(c) Test of significance
(d) Measure of central tendency

238. Association can be measured by all *except*:
(a) Correlation coefficient *[AIIMS May 2009]*
(b) Cronbach's alpha
(c) P value
(d) Odds ratio

239. Method used for comparison of a new test with an available gold-standard test is: *[AIIMS November 2011]*
(a) Regression analysis/Likelihood test
(b) Correlation analysis/Bland and Altmann test
(c) Baltin and Altimore method
(d) Kimorov and Samletor technique

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240. If confidence limit is increased, then: *[AIIMS PGMEE May 2013]*

(a) Previously insignificant data becomes significant
(b) Previously significant data becomes insignificant
(c) No effect on significance
(d) Any change can happen

241. In a group of 100 people, the average GFR is 85ml/ min with a Standard deviation of 25. What is the range for 90% Confidence Intervals? *[AIIMS May 2015]*

(a) 70-100
(b) 75-95
(c) 81-89
(d) 80-90

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EXPLANATIONS

DATA, VARIABLES AND SCALES

1. Ans. (a) Quantitative data of a group of patients *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p104 and Methods in Biostatistics by Mahajan, 6/e p20, 7/e p18; Park 23/e p844-846]*

- *Data presentation:*

Quantitative data	Qualitative data
Histogram	Bar diagram
Frequency polygon	Pie/Sector diagram
Frequency curve	Pictogram/Picture diagram
Line chart/ graph	Map diagram/Spot map
Cumulative frequency diagram (Ogive)	
Scatter/ Dot diagram	

- *Histogram:*
  - Is graphical presentation for 'continuous quantitative data'
  - Continuous groups are marked on x-axis (abscissa) while frequencies are marked on y-axis (ordinate).

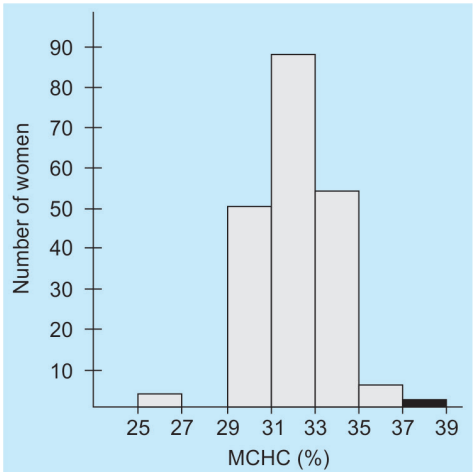

Figure: Histogram

2. Ans. (b) Severity of anemia *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p51-52]*

- *Scales of measurement:*

	Categorical scales		Dimensional scales
	Nominal scale	**Ordinal scale**	**Metric scale**
Definition	Based on NOM (names); no specific order	Based on ORD (order); grading into categories	Based on ME (measurement); in terms of quantities
Variables	Qualitative	Qualitative	Quantitative
Examples	Race	TNM staging (cancers)	Blood glucose
	Religion	Severity of a disease	Hemoglobin level
	Country of birth	Social classes	Serum cholesterol
	Clinical features		Weight
	Sites of lymphadenopathy		Height
	Sex of child		Mid-arm circumference

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	Type of anemia		Blood pressure
	ABO blood group		Pulse rate
	Site of malignancy		Temperature (°C, °F, K) scale
Permissible arithmetic	Counting	> or < operations	Interval scale: +/ –
			Ratio scale: ×/÷
Permissible statistics	Mode, Chi–square	Median, Percentile	Interval scale: Mean, SD, Correlation, Regression, ANOVA Ratio scale: Geometric mean, Harmonic mean, Coefficient of variation

- *Metric scale is of 2 types:*
  - Interval scale (Absence of absolute zero; no ratios are possibl(e): Examples: Centigrade/Fahrenheit temperature scale
  - Ratio scale (Presence of absolute zero; thus ratios are possibl(e): Examples: Weight, Height, Blood glucose, Hemoglobin level, Serum cholesterol, Mid-arm circumference, Blood pressure, Pulse rate, Kelvin temperature scale
- Statistically most preferable scale of measurement: Metric scale
- Statistically least preferable scale of measurement: Nominal scale

In the given question, Severity of anemia (mild – moderate – severe) is a continuum of outcome for a variable, thus is measured on a ordinal scale

Also, Type of anemia (Iron deficiency anemia, Megaloblastic anemia) is measured on a nominal scale, Hemoglobin level & Serum ferritin level (direct measurement possible) is measured on a metric scale.

3. Ans. (d) Continuous ***[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p53-54]***

- *Blood pressure (BP):*
  - Is a quantitative variable: Can be measured directly
  - Is a continuous variable: Sphygmanometer can only measure with a minimum count of 2 mm Hg; but it has several in-between values
  - Is a polyotomous variable: BP can have several values possible.

Also Remember

- *Weight:* Is a quantitative, continuous, polyotomous variable
- *Height:* Is a quantitative, continuous, polyotomous variable
- *Pulse rate (PR):* Is a quantitative, continuous, polyotomous variable
- *Blood pressure (BP):* Is a quantitative, continuous, polyotomous variable
- *Temperature:* Is a quantitative, continuous, polyotomous variable
- *ABO blood group:* Is a qualitative, discrete, polyotomous variable
- *Rhesus (Rh) blood group:* Is a qualitative, discrete, dichotomous variable
- *Gender:* Is a qualitative, discrete, dichotomous variable.

4. Ans. (b) Continuous ***[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p104 and Methods in Biostatistics by Mahajan, 6/e p20-22, 7/e p18-20; Park 23/e p845]***

Also Remember

- *Frequency polygon:* Is an area diagram of frequency distribution developed over a histogram (by joining mid-points of class intervals at heights of frequencies)
- *Frequency curve:* When no. of observations is large and group-interval is reduced, then frequency polygon loses its angulations to become a curve
- *Line chart/graph:* Is a frequency polygon presenting variations by line; shows the trend of an event over a period of time
- *Cumulative frequency diagram (Ogiv(e):* Is graph of cumulative relative frequency distribution
- *Scatter/Dot diagram (Correlation diagram):* Is used to depict 'correlation (relationship) between 2 quantitative variables'
- *Bar diagram:* Is for visual comparison of magnitude of different frequencies in discrete data
- *Pie/Sector diagram:* Is for 'presentation of discrete data of qualitative characteristics'; all pie categories are mutually exclusive, with a total of 100% (360°)
- *Pictogram/Picture diagram:* Is a method to impress the frequency of occurrence of events to common man
- *Map diagram/Spot map:* Is prepared to show geographical distribution of frequencies of characteristic; Each spot (dot) marks one frequency.

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5. Ans. (c) Gender *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p53]*

- Variable: Is a characteristic or attribute that vary from person to person, from time to time and from person to person

Quantitative variable	Qualitative variable
Is a variable that can be measured directly	Is a variable that cannot be measured directly
Measured on ordinal/metric scale	Measured on a nominal scale
Examples:	*Examples:*
Weight	ABO blood group
Height	Gender
Mid-arm circumference	Sites of lymphadenopathy
Blood sugar level	Presence of Diabetes
°C/ °F temperature scale	Weather
Body mass index (BMI)	Obesity
Hemoglobin level	Type of anemia
Serum cholesterol level	

Also Remember

- *BP is a continuous variable:* Sphygmanometer can only measure with a minimum count of 2 mm Hg; but it has several in-between values.
- *Pulse rate (PR) is a continuous variable:* Human mind can only process 72 or 73 beats per minute (and not 72.3 beats per minute); but if PR is counted as 216 in 3 minutes then PR will be 72.3 beats per minute.

6. Ans. (c) Bar chart *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p101-02 and Methods in Biostatistics by Mahajan, 6/e p30-34, 7/e p28-32; Park 23/e p844-845]*

- *Bar diagram/chart:*
  - Is for visual comparison of magnitude of different frequencies in discrete data
  - Is a diagram appropriate for disjoint categories (nominal or ordinal) to show the no. of subjects or mean or rates by bars of corresponding height
  - Is 'the most versatile of all statistical diagrams'
  - *Bar diagram is of 3 types:*
    1. Simple bar diagram
    2. Multiple bar diagram
    3. Proportional bar diagram

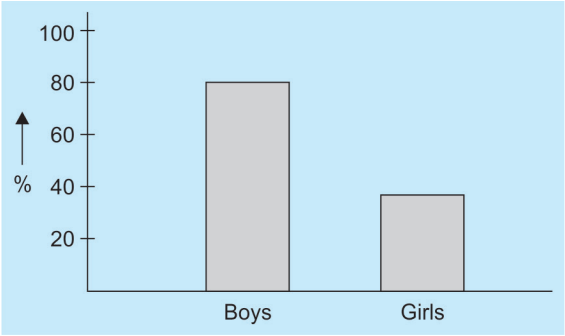

Figure: Bar diagram

7. Ans. (d) Ordinal *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p51-52]*

In the given question, a physician, after examining a group of patients of a certain disease, classifies the condition of each one as 'Normal', 'Mild', 'Moderate' or 'Severe'. 'Normal-mild-moderate-severe' is a continuum of outcome for a variable, thus is measured on a ordinal scale.

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Also Remember

- *Likert Scale:*
  - Is also known as 'Summative scale'
  - Is a 'type of Ordinal scale'
  - Is generally used to quantify attitudes and behaviour
  - 'Responses are graded on a continuum' (For example: Strongly agree – Agree – Neutral – Disagree – Strongly disagree)
  - No. of responses are usually 3, 5 or 7
  - Likert scale is 'usually a bipolar scaling' method: It measures positive or negative response to a statement
  - *Likert response can be:*
    1. Collated into bar charts
    2. Central tendency summarized as median or mode (NOT mean)
    3. Dispersion summarized by range (NOT standard deviation)
    4. Analyzed by non-parametric tests.

8. **Ans. (a) Interval/Ratio scale** *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p52]*
   - *Most satisfying scale for measurement of quantities:* Metric scale
     - *Mean and SD can only be worked out on:* Interval/Ratio scale
   - *Measurements are east to handle in:* Ratio scale.

9. **Ans. (c) Categorical data** *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p51-52]*

10. **Ans. (a) Nominal** *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p51]*
    In the given question, an investigator into the life expectancy of IV drug abusers divides a sample of patients into HIV-positive and HIV- negative groups; Since there is no order of characteristic and it cannot be measured directly, it can't be an ordinal data or metric data respectively.
    Thus it is nominal data (based only on names, i.e. HIV- positive and HIV- negative groups).

11. **Ans. (d) Relationship between two given variables** *[Ref. Park 23/e p846]*
    SCATTER DIAGRAM
    - Also known as 'Correlation diagram' or 'Dot diagram'
    - Is used to depict 'correlation (relationship) between 2 quantitative variables'
    - Vertical axis in scatter diagram: should be the dependent or the outcome variable
    - In a scatter diagram, 2 imaginary lines are drawn along the distribution of dots/scatter
    - *Types of correlation:*

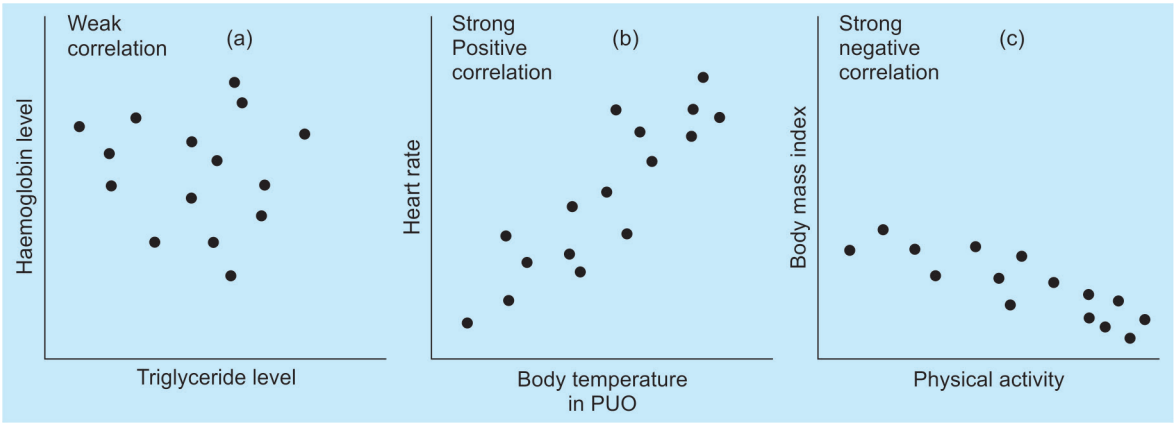

Figure: Scatter Diagrams in the cases in weak, strong positive and strong negative correlation

Types of correlation	Scatter diagram	Correlation coefficient	Interpretation
Perfectly positive correlation	Both lines have a positive slope (at 45° each); superimposed	r = +1	Rise in one variable leads to proportionate rise in other

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Perfectly negative correlation	Both lines have a negative slope (at 45° each); superimposed	r = –1	Rise in one variable leads to proportionate fall in other
Moderately positive correlation	Both lines have a positive slope	0 < r < +1	Rise in one variable leads to rise in other
Moderately negative correlation	Both lines have a negative slope	–1 < r < 0	Rise in one variable leads to fall in other
No (absent) correlation	Both lines are perpendicular	r = 0	Rise/fall in one variable leads to no change in other
Spurious (false) correlation	No particular pattern observed	–	No particular pattern observed

12. Ans. (c) Likert Scale *[Ref. A Dictionary of Public Health by J Kishore, p475-76]*

- *Likert Scale: Refer to Theory.*
- *Visual analog scale (VAS):*
  - VAS is a measurement instrument that tries to measure a characteristic that range across a continuum of values and cannot easily be directly measured (For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain. From the patient's perspective this spectrum appears continuous as their pain does not take discrete jumps, as a categorization of none, mild, moderate and severe would suggest)
  - Operationally a VAS is usually a horizontal line, 100 mm (10 cms) in length, anchored by word descriptors at each end: patient marks on the line the point that they feel represents their perception of their current state
  - VAS score: is determined by measuring in millimetres from the left hand end of the line to the point that the patient marks
  - Continuous (or 'analogue') aspect of the scale differentiates it from discrete scales such Likert scale
  - Is quite used in Anaesthesia.
- *Guttman Scale:*
  - Is also known as 'Cumulative scale'
  - Contains a 'series of statements that expresses increasing intensity' of a characteristic AND respondent is asked to agree or disagree to with each statement (For example: Asbestos can cause lung cancer – Asbestos is an important cause of lung cancer – Asbestos is a very important cause of lung cancer and death – Asbestos is the most important cause of lung cancer an death in India)
  - Perfect Guttman scale: consists of a uni-dimensional set of items that are ranked in order of difficulty from least extreme to most extreme position
- *Adjectival scale:*
  - Is a linguistic scale is a set of words, of the same grammatical category, which can be ordered by their semantic strength or degree of information (For example, lukewarm, warm, and hot fall along a single adjectival scale since they indicate a variation in the intensity of temperature of the modified noun).

13. Ans. (b) Ordinal *[Ref. A Dictionary of Public Health by J Kishore, p475-76]*

14. Ans. (b) Histogram *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p104 and Methods in Biostatistics by Mahajan, 7/e p18-20]*

15. Ans. (a) Scatter diagram *[Ref. K. Park 23/e p846]*

16. Ans. (c) Line diagram *[Ref. K. Park 23/e p846]*

17. Ans. (c) Body weight *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p51-52]*

18. Ans. (b) Line chart *[Ref. K. Park 23/e p846]*

19. Ans. (a) Line diagram *[Ref. K. Park 23/e p846]*

20. Ans. (b) Scatter diagram *[Ref. K. Park 23/e p846]*

21. Ans. (a) Ordinal scale *[Ref. A Dictionary of Public Health by Dr J Kishore, p475-76]*

22. Ans. (a) Types of hospitals *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p53]*

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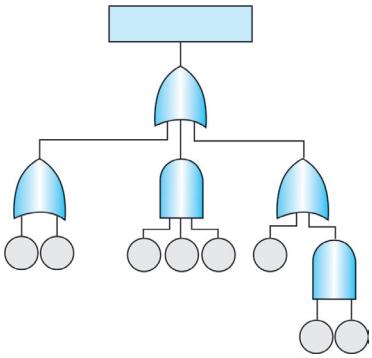
23. Ans. (d) Tree diagram

- A tree diagram is simply a way of representing a sequence of events along with their probabilities
- Tree diagrams are particularly useful in probability since they record all possible outcomes in a clear and uncomplicated manner



- **In the given question,** Branches can indicate different joints involvement in the case of Diabetes; Further branches can indicate if test conducted was positive or not
- It can further help in Decision making for treatment joint wise and overall

24. Ans. (c) Stem and Leaf plot *[Ref. Basic Statistics by Hatcher, 1/e p187]*

STEM AND LEAF PLOT

- *Description*: A special table where each data value is split into a "stem" (the first digit or digits) and a "leaf" (usually the last digit)
  - *Stem*: Vertical column of numbers listed downwards
  - *Leaves*: Each horizontal row of numbers
- *Utility*: Detailed quantitative data presentation, a method for showing the frequency with which certain classes of values occur

25. Ans. (d) Box and Whisker plot *[Ref. Business Statistics by Black, 7/e p85]*

BOX AND WHISKER PLOT

- *Description*: A convenient way of graphically depicting groups of numerical data through their quartiles
- *Line in Box*: 2nd Quartile (Median)
- *Whiskers end*: 1st Quartile and 3rd Quartile

Review Questions

26. Ans. (a) Histogram *[Ref. Park 23/e p845]*

27. Ans. (b) Histogram *[Ref. Park 23/e p845]*

28. Ans. (c) Ordinal *[Ref. Indrayan, 1/e p 51-52]*

29. Ans. (b) Quantitative continuous data *[Ref. An Introduction to Medical Statistics by Bland 2/e p47, 50 Park 21/e p784, Park 23/e p845]*

MEASURES OF CENTRAL TENDENCY

30. Ans. (c) Median *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p108-11 and Methods in Biostatistics by Mahajan, 6/e p36-38, 7/e p33-35; Park 23/e p847]*

MEASURES OF CENTRAL TENDENCY

- Mean (Average): Is obtained as sum of all values divided by the no. of values.

Mean = $\Sigma x/n$

- *Median:* Middlemost value in a distribution arranged in an ascending or descending order of values
  - *In a distribution with odd no. of total values:* Middlemost value in a distribution arranged in an ascending or descending order of values

$$\text{Median} = ((n + 1)/2)\text{th value}$$

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- *In a distribution with even no. of total values:* Such a distribution has 2 middlemost values; median is the average of two middlemost values when arranged in an ascending or descending order of values

  Median = Mean (average) of (n/2)th and (n/2 + 1)th value

- *Mode:* Most frequent or most commonly occurring value in a distribution
  - *In a distribution with one most frequent value:* Mode is the most frequent or most commonly occurring value in the distribution
  - *In a distribution with two most frequent values:*
    1. There will be 2 Modes (2 most frequent values in the distribution): Bimodal distribution
    2. Mode = Average of 2 modes

In the given question, out of 11 births in a hospital, 5 babies weighed over 2.5 kg and 5 weighed less than 2.5 kg,
Thus, when arranged in ascending or descending order, 2.5 kg will be the central value,
So, value do 2.5 represent Median.

Also Remember

- *Central tendency in various distributions:*

Distribution	Central tendency
Normal (Gaussian) distribution	Mean = Median = Mode (coincide)
Right (Positive) skew distribution	Mean > Median > Mode
Left (Negative) skew distribution	Mean < Median < Mode

- In a bimodal series, Mode = 3 Median – 2 mean
- *In distribution with extreme values (Outliers):*
  - *Most affected measure of central tendency:* Mean
  - *Least affected measure of central tendency:* Mode
  - *Most preferable measure of central tendency:* Median.

31. Ans. (c) Median *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p111 and Methods in Biostatistics by Mahajan, 7/e p34; Park 21/e p785-86, Park 23/e p847]*

In the given question,

- Incidence of malaria in an area is 250, 320, 190, 300, 5000, 100, 260, 350, 320, and 160
- And, incidence in ascending order is 100, 160, 190, 250, 260, 300, 320, 320, 350, 5000
- Mean = $\Sigma x/n = 7250/10 = 725$
- Median = Mean (average) of 5th and 6th value = (260 + 300)/2 = 280
  Mode = 320
- Since extreme values (outliers) are present for incidence (20 and 5000), mean will not be an appropriate measure of central tendency,

Thus median will be the most suitable measure of central tendency.

32. Ans. (c) Median *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p111 and Methods in Biostatistics by Mahajan, 7/e p34; Park 23/e p847]*

In the given question

- Incidence of malaria in an area is 20, 20, 50, 56, 60, 5000, 678, 898, 345, 456
- And, incidence in ascending order is 20, 20, 50, 56, 60, 345, 456, 678, 898, 5000
- Mean = $\Sigma x/n = 7583/10 = 758.3$
- Median = Mean (average) of 5th and 6th value = (60 + 345)/2 = 202.5
- Mode = 20
- Since extreme values (outliers) are present for incidence (20 and 5000), mean will not be an appropriate measure of central tendency,

Thus median will be the most suitable measure of central tendency.

33. Ans. (a) 5 *[Ref. Elementary statistical methods by Gupta, 1/e p191; Park 23/e p847]*

- In a bimodal series Mode = 3 Median – 2 mean

In the given question, mean is 2 and median is 3 in a bimodal series
Thus Mode = 3(3) – 2(2) = 9 – 4 = 5

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34. Ans. (d) 20 kg *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p109-10 and Methods in Biostatistics by Mahajan, 7/e p34; Park 23/e p847]*

- Mean (Averag(e): Is obtained as sum of all values divided by the no. of values

Mean = Σ x/n

In the given question, = 18.2 kg and n = 10

Thus Σ x = 182

Also, weight of one of the boys was wrongly recorded as 2.0 kg that should have been 20 kg

True Σ x = 182 + (20 – 2.0) = 200

So true Mean = Σ x (true)/n = 200/10 = 20.0 kg.

35. Ans. (b) Median *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p108-11 and Methods in Biostatistics by Mahajan, 7/e p34-35; Park 23/e p847]*

MEASURES OF CENTRAL TENDENCY

- Examples:

Distributions	1, 7, 3, 6, 4, 8, 9, 5, 5	1, 7, 3, 3, 6, 4, 8, 9, 5, 6
Total no. of values	9	10
Ascending order	1, 3, 4, 5, 5, 6, 7, 8, 9	1, 3, 3, 4, 5, 6, 6, 7, 8, 9
Mean (Σ x/n)	48/9 = 5.33	52/10 = 5.2
Median (middlemost value)	5	(5 + 6)/2 = 5.5
Mode	5	3 and 6 (bi-modal) OR (3 + 6)/2 = 4.5 (uni-modal)

36. Ans. (a) Mean; (b) Median; (c) Mode *[Ref. Park 23/e p847]*

37. Ans. (a) Blood pressure *[Ref. Quick MBA statistics]*

- Applications of Central Tendency

Measurement scale	Best measure
Nominal	Mode
Ordinal	Median
Metric: Interval	*Symmetrical data:* Mean *Skewed data:* Median
Metric: Ratio	*Symmetrical data:* Mean *Skewed data:* Median

In the given 1question, Survival time, Incubation period, Health expenses may present with skewed data (few extreme values) so Median is suitable; BUT Blood pressure follows normal distribution so Mean is more suitable.

38. Ans. (a) Mean 77; (b) Median 77; (c) Mode 70 *[Ref. Park 23/e p847]*

39. Ans. (b) 16, 10, 10 *[Ref. Park 23/e p847]*

40. Ans. (b) Increased Mean, No change in median *[Ref. Park 23/e p847]*

In the given question, Sleep apnea scores of 10 students is recorded. If the highest value (obtained 58) is wrongly recorded as 85 then,

- *Mean will Increase*: As total sum in numerator will increase while denominator (number of persons 10) remain same
- *Median will not change*: As only the highest value changes, Middle value in the distribution (Ascending order) remains same
- *Mode*: Is unlikely to change (unless 58 was the mode, the it may change)

Review Questions

41. Ans. (b) 8 *[Ref. Park 23/e p847]*

42. Ans. (b) Mode *[Ref. Park 23/e p847]*

43. Ans. (b) Range is 20-38 *[Ref. Park 23/e p847]*

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44. Ans. (d) Chi-square test *[Ref. Park 23/e p847]*

45. Ans. (c) Median *[Ref. Park 23/e p847]*

OTHER MEASURES OF LOCATION

46. Ans. (a) 100 equal parts *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p111-12 and Methods in Biostatistics by Mahajan, 7/e p45-52; Park 21/e p785-86, Park 22/e p789-90]*

CENTILE (PERCENTILE):

- Divides a distribution into 100 equal parts, AFTER arranging in an ascending order, SUCH THAT each part/ segment has equal number (n/100) of subjects
- Requires 99 intercepts (cut-off points) for division into 100 parts
- *Total percentiles:* 99
- *The nth percentile implies:* When all values are arranged in ascending order, n% are below this value
- *Methods for location of percentiles:*
  - *Graphical method:* Cumulative frequency diagram (Ogive)
  - *Arithmetic method:* Cumulative frequency table
- *Applications and uses of percentiles:*
  - Location of a percentile
  - Preparation of a standard percentile (Q2, Median) for particular age, sex, etc.
  - Comparison of a percentile value of a variable (between samples or populations)
  - To study growth in children (using growth charts)
  - As a measure of dispersion (interquartile/semi-interquartile range).

Also Remember

- *Division of distributions:*

	Divides distribution into	No. of intercepts
Tertile	3 equal parts	2
Quartile	4 equal parts	3
Pentile (Quintile)	5 equal parts	4
Hextile	6 equal parts	5
Heptile	7 equal parts	6
Octile	8 equal parts	7
Decile	10 equal parts	9
Centile (Percentile)	100 equal parts	99

- *Quartile:* Divides a distribution into 4 equal parts, so the number of intercepts required will be 3, i.e. Q_1, Q_2, Q_3.
  - Q_1 (1st Quartile) divides a distribution in a ratio of 1 : 3
  - Q_2 (2nd Quartile) divides a distribution in a ratio of 1 : 1
  - Q_3 (3rd Quartile) divides a distribution in a ratio of 3 : 1

Also Remember

- Median (middlemost point in an ascending/descending distribution) divides a distribution in the ratio of 1 : 1
  - Is equivalent to second quartile (Q^2)
  - Is equivalent to 50th percentile (P50)
  - Each segment has n/2 subjects.

47. Ans. (b) Median *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p112 and Methods in Biostatistics by Mahajan, 7/e p45-52]*

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48. Ans. (c) 512 *[Ref. Mathematics, Class X)*

$P = C (1 + r)^n$

where, P = Final value

C = Initial value

r = fraction increase

n = no. of times increase

In the given question, A bacterium can divide every 20 minutes and exponential growth is for 3 hours,

Thus, C = 1,

And r = 1 (it doubles every time)

n = 3 hours/20 minutes = 9 times

Thus $P = C (1 + r)^n = 1 (1 + 1)^9 = 2^9 = 512$

One Other Simple Way of Doing IT

- Given information: A bacterium can divide every 20 minutes (3/hour)
- Thus in 3 hours, it will total divide 3/hour × 3 hours = 9 times
- Thus 9 times multiplication will successively yield 2, 4, 8, 16, 32, 64, 128, 256, 512 bacteria.
- So at end of 9 hours, there will be 512 bacteria.

49. Ans. (c) 100th *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p112 and Methods in Biostatistics by Mahajan, 6/e p48-57]*

PERCENTILES (CENTILES):

- Are values in a series of observations arranged in an ascending order of magnitude 'which divides a distribution into 100 equal parts'
- In all there are a 'total of 99 percentiles'
- Median is 50th centile (50th percentile has 50% observations on either side)
- Percentile and Percentage:
  - 'x' percentile implies: x% values are below this value
  - For example, 40th percentile implies 40% values are below it
- In general:
  - kth percentile = (k × n/ 100)th value
  - In the given question, n = 250 subjects, thus 40th percentile would be ,
  - 40th percentile = (40 × 250/ 100) th value = 100th value

50. Ans. (d) 2nd quartile *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p112-13 and Methods in Biostatistics by Mahajan, 7/e p45]*

- *Quartile:* Divides a distribution into 4 equal parts, so the number of intercepts required will be 3, i.e. Q_1, Q_2, Q_3
  - So, Zero – Q_1 covers 25% values
  - Similarly, $Q_2 - Q_1$, $Q_3 - Q_2$ and 100 – Q_3 all cover 25% values each
  - Thus, Q_2 – Zero, 100 – Q_2 and $Q_3 - Q_1$ all cover 50% values each
  - Q_1 divides a distribution in a ratio of 25 : 75 OR 1 : 3
  - Q_2 divides a distribution in a ratio of 50 : 50 OR 1 : 1, Thus second quartile is equivalent to median
  - Q_3 divides a distribution in a ratio of 75 : 25 OR 3 : 1.

In the given question, n = 180

Thus Q_2 which is equivalent to median, divides a distribution in a ratio of 50 : 50 OR 1 : 1.

51. Ans. (c) Third quartile *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p112-13 and Methods in Biostatistics by Mahajan, 7/e p45]*

- *Quartile:* Divides a distribution into 4 equal parts, so the number of intercepts required will be 3, i.e. Q_1, Q_2, Q_3.
  - So, Zero – Q_1 covers 25% values
  - Similarly, $Q_2 - Q_1$, $Q_3 - Q_2$ and 100 – Q_3 all cover 25% values each

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- Thus, Q_2 – Zero, 100 – Q_2 and Q_3 – Q_1 all cover 50% values each

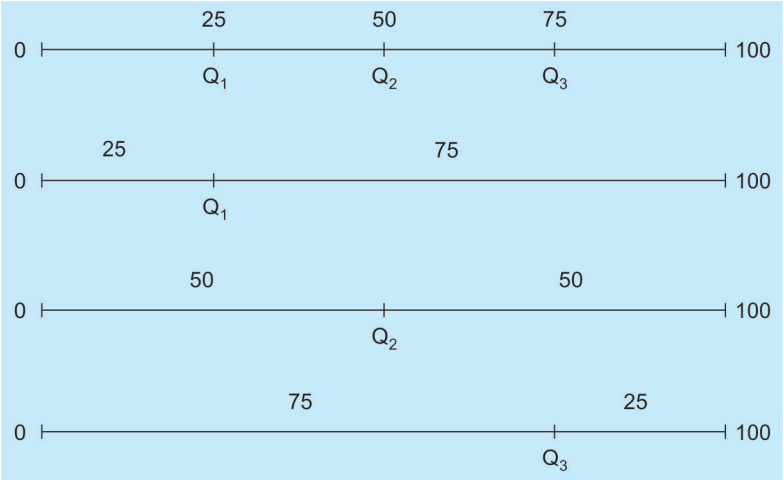

Figure: Quartiles

- Q_1 divides a distribution in a ratio of 25 : 75 OR 1 : 3
- Q_2 divides a distribution in a ratio of 50 : 50 OR 1 : 1, THUS SECOND QUARTILE IS EQUIVALENT TO MEDIAN
- Q_3 divides a distribution in a ratio of 75 : 25 OR 3 : 1.

52. Ans. (b) 50 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p112-13; Methods in Biostatistics by Mahajan, 7/e p45]*

- Among 200 persons, Q_1, Q_2, and Q_3 would be located at 50th, 100th and 150th person respectively
- This would divide data of 200 persons into Four equal parts of 50 each
- Also, Q_3 (3rd Quartile) divides a distribution in a ratio of 3 : 1 i.e, 150:50
- So last quarter would include 50 persons

53. Ans. (b) 53.6 *[Ref. Research by Thomas, 6/e p136]*

PERCENTILE CALCULATION

- Standard normal distribution is also be useful for computing percentiles:
  - *Median*: 50th percentile
  - *First quartile*: 25th percentile
  - *Third quartile*: 75th percentile
- Percentile formula,

$X = \mu + Z\sigma$ (where μ is Mean, σ is SD and Z is Value from Normal distribution for Desired percentile)

- Z values for commonly used percentiles:

Percentile	Z value
1st	– 2.326
2.5th	– 1.960
5th	– 1.645
10th	– 1.282
25th	– 0.675
50th	0
75th	0.675
90th	1.282
95th	1.645
97.5th	1.960
99th	2.326

In the given question, Mean = 70 mm Hg, SD = 10 mm Hg, Z = – 1.645 and X = 5th percentile value
So, X_5 = 70 + (– 1.645) 10 = 53.6 mm Hg

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VARIABILITY

54. Ans. (c) Deviation from mean value *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p114-15 and Methods in Biostatistics by Mahajan, 7/e p60-68; Park 23/e p848]*

- *Measures of variability:*

Measures of variability	
Individual observations	**Samples**
Range	Standard error of mean
Inter-quartile range	Standard error of difference between 2 means
Mean deviation	Standard error of proportion
Standard deviation	Standard error of difference between 2 proportions
Coefficient of variation	Standard error of correlation coefficient
	Standard deviation of regression coefficient

STANDARD DEVIATION (SD)

- SD is most common and generally most appropriate measure of dispersion
- SD is defined as the 'root-mean-square (RMS) deviation of the values from their mean', or as the square root of the variance
- SD calculation: $= \sqrt{(\text{Variance})} = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n}}$
- *Interpretation of SD:*
  - A large standard deviation: Data points are far from the mean
  - A small standard deviation: Data points are clustered closely around the mean
- *Uses of SD in biostatistics:*
  - Summarizes the deviation of a large distribution from mean
  - Indicates whether the variation of difference of an individual from the mean is by chance
  - Helps in finding the standard error
  - Helps in finding the suitable size of sample for valid conclusions

Also Remember

- *Measures of chance:*
  - Probability – Odds (& Odds ratio) – Likelihood ratio
- *Measures of Central tendency:*
  - Mean – Median – Mode

55. Ans. (a) 25% *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p115 and Methods in Biostatistics by Mahajan, 7/e p68-69; Park 21/e p787, Park 22/e p791]*

- *Coefficient of variation:*
  - Is a measure used to compare relative variability
  - Is a unit-free measure to compare dispersion of one variable with another
  - Is SD expressed as percentage of mean

$$CV = \frac{SD}{Mean} \times 100 = \frac{\sigma}{\mu} \times 100$$

In the given question, Median weight (μ) = 12 kg, n = 100, Standard deviation (σ) = 3, Thus, coefficient of variance = $\sigma/\mu \times 100 = 3/12 \times 100 = 25\%$.

Also Remember

- *Multiple correlation coefficient:* Is used for calculation of correlation between one variable (dependent) and the combination of two or more variables (independents)

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- *Coefficient of determination:*
  - Is the percentage of variation in a variable that is explained by one or more of the others
  - Is generally obtained in a regression setup
  - Coefficient of determination = (Correlation coefficient)^2 = r^2
- *Correlation coefficient (r):* Measures the degree or strength of relationship in a correlation
  - Correlation coefficient (r) lies between: –1 to + 1 (–1 < r < + 1).

56. Ans. (a) 0.4 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p140 and Methods in Biostatistics by Mahajan, 7/e p105, 117-18]*

STANDARD ERROR OF MEAN (SE_{MEAN})

- SEmean is the measure of difference between sample and population values: Whatever be the sampling procedure or the care taken while selecting sample, the sample estimates (statistics) will differ from population values (parameters)
- SE is a 'measure of chance variation', and IT DOESNOT mean an error or mistake.

$$SE_{mean} = \frac{\text{Standard deviation (SD)}}{\text{Sample size}} = \frac{\sigma}{\sqrt{n}}$$

In the given question, n = 25 kids, Standard deviation (σ) = 2, Mean incubation period (μ) = 8 days,
Thus, standard error = 0.4.

- Greater the standard deviation (σ), greater will be the standard error (SE), especially in small samples
- *SE can be minimized by reducing SD:* By taking a large sample
- *SE is a measure of variability of sample summaries:* SE_{mean} is the SD of sample means
- *Uses of standard error of mean (SEmean) in large samples:*
  - To work out limits of desired confidence within which population mean would lie
  - To determine if sample is drawn from a known population or not
  - To find SE of difference between 2 means (to know if difference is real and statistically significant)
  - To calculate sample size (within desired confidence limits)
- Standard error of difference between 2 means: $SE_{diff\ bet\ means} = \sqrt{(\sigma_1^2 / n_1 + \sigma_2^2 / n_2)}$

57. Ans. (b) Sampling errors *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p139-40 and Methods in Biostatistics by Mahajan, 7/e p117-18; Park 23/e p850]*

Also Remember

- Sampling errors are not errors in conventional sense
- Standard error of difference between 2 means: $SE_{diff\ bet\ means} = \sqrt{(\sigma_1^2 / n_1 + \sigma_2^2 / n_2)}$
- Standard error of proportion: $SE_{proportion} = \sqrt{pq/n}$; where q = (1 – p)
- Standard error of difference between 2 proportions: $SE_{diff\ bet\ proportions} = \sqrt{(p_1q_1 / n_1) + (p_2q_2 / n_2)}$

58. Ans. (b) 0 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p114-15 and Methods in Biostatistics by Mahajan, 7/e p60-68; Park 23/e p848]*

In the given question, the birth weight of each of the 10 babies born in a hospital in a day is found to be 2.8 kg, thus, SD = ZERO

So the standard deviation of this sample will be, SD (σ) = $\sqrt{(\text{Variance})} = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n}}$ = Zero.

59. Ans. (b) 0.1 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p139-40 and Methods in Biostatistics by Mahajan, 7/e p117-19; Park 23/e p850]*

In the given question, n = 100 women, mean Hemoglobin (μ) = 10 gm%, standard deviation (σ) = 1,

Thus standard error (SE) = $\frac{SD}{\sqrt{\text{sample size}}} = \frac{\sigma}{\sqrt{n}} = \frac{1}{\sqrt{100}} = 0.1$

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60. Ans. (a) Original std. Deviation × 10 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p114-15 and Methods in Biostatistics by Mahajan, 7/e p60-68; Park 21/e p787, Park 22/e p791]*

SD (σ) new = $10\sqrt{\Sigma(x-\bar{x})^2/n}$ = 10 × Original SD.

Also Remember

- *In a Normal/Gaussian distribution:*
  - Curve is 'bilaterally symmetrical, bell-shaped'
  - Mean, Median and Mode coincide (Mean = Median = Mode)
  - Has Mean (μ) = 0 and SD (σ) = 1
    1. Mean ± 1SD (μ ± 1σ) covers 68% values
    2. Mean ± 2SD (μ ± 2σ) covers 95% values
    3. Mean ± 3SD (μ ± 3σ) covers 99% values
- *Z score (Standard score)*:
  - Is difference of a value from group mean, in terms of how many times of SD (σ).
    Z score = (Individual level – Mean)/SD = (x – μ)/σ
  - Z score indicates how many standard deviations an observation is above or below the mean
- *Coefficient of variation:*
  - Is a measure used to compare relative variability
  - Is a unit-free measure to compare dispersion of one variable with another
    CV = SD/Mean × 100 = σ/μ × 100
- *Standard error of mean:*

  $SE_{mean} = SD/\sqrt{\text{sample size}} = \sigma/\sqrt{n}$

- *Precision:*
  Precision = $1/SE_{mean} = \sqrt{n}/\sigma$

61. Ans. (d) 1.0 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p115-16]*

Z SCORE (STANDARD SCORE):
- Is also known as 'normal deviate'
- Is difference of a value from group mean, in terms of how many times of SD (σ)

$$\text{Z score} = \frac{\text{Individual level} - \text{Mean}}{\text{SD}} = \frac{(x-\mu)}{\sigma}$$

- The standard score indicates how many standard deviations an observation is above or below the mean
- Z scores are frequently used in assessing how far a child is in his relative growth to a standard
  - Z score = 2: Any measurement of atleast 2SD away is considered too far away to be normal.

In the given question,
x = 15.0 g/dl, μ = 13.5 g/dl, σ = 1.5 g/dl
Thus, Z score = (x – μ)/σ = (15.0 – 13.5)/1.5 = 1

62. (c) 0.1 gm% *[Ref. K. Park 23/e p850]*

63. (a) Range; (b) Mean deviation; (c) Standard deviation *[Ref. Methods in Biostatistics by Mahajan, 7/e p60-68]*

64. Ans. (d) Standard deviation *[Ref. K. Park 23/e p848]*

65. Ans. (c) 72-88% *[Ref. Simple Biostatistics by Indrayan, 1/e p146]*
Confidence Intervals for Population proportions (For 95% Confidence)
CI = P ± 2 SEP = P ± 2 √pq/n
In the given question, P=0.80 (80%); p=0.80; q= 1-p = 1-0.80 = 0.20; n=100
CI = 0.80 ± 2 √0.8*0.2/100 = 0.80 + 0.08 = 0.72, 0.88 (72%, 88%)

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66. **Ans. (a) 0.34** *[Ref. K Park 23/e p849]*

NORMAL DISTRIBUTION

- Shape is bilaterally symmetrical
- Mean = Median = Mode (coincide)
- 50% of all values lie above Mean (or Median or Mode)
- Mean ± 1SD cover 68% values (Mean + 1SD cover 34% values)
- Mean ± 2SD cover 95% values (Mean + 2SD cover 47.5% values)
- Mean ± 3SD cover 99% values (Mean + 3SD cover 49.5% values)

67. **Ans. (b) 0.50** *[Ref. K Park 23/e p849]*
    - *In a Normal distribution, 50% of values lie above Mean (or Median or Mode)*

68. **Ans. (b) Coefficient of variation** *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p115]*

69. **Ans. (b) Indicated distribution of variables; (c) Most common method used for dispersion; (d) Better indicator of variance than range** *[Ref. Park 23/e p848]*

Review Questions

70. **Ans. (a) 210 - 250** *[Ref. 23/e p849]*

71. **Ans. (b) 95%** *[Ref. 23/e p849]*

72. **Ans. (d) Correlation and regression** *[Ref. Park 23/e p852-853]*

73. **Ans. (b) Mean and standard deviation** *[Ref. Park 23/e p849]*

74. **Ans. (a) Normal distribution** *[Ref. K Park 23/e p849]*

75. **Ans. (b) S = square root of V** *[Ref. An Introduction to Medical Statistics by Bland, 2/e p60]*

76. **Ans. (c) 95%** *[Ref. K Park 23/e p849]*

77. **Ans. (a) Standard deviation** *[Ref. Park 23/e p848]*

78. **Ans. (b) Median** *[Ref. Park 23/e p847]*

79. **Ans. (a) Standard deviation** *[Ref. K Park 23/e p850]*

DISTRIBUTIONS – NORMAL AND SKEWED

80. **Ans. (d) Poisson distribution** *[Ref. Internet]*

POISSON DISTRIBUTION:

- Is a 'discrete probability distribution' that expresses the 'probability of a number of events occurring in a fixed period of time' (if these events occur with a known average rate and independently of the time since the last event)
- It can also be used for the number of events in other specified intervals such as distance, area or volume
- Is generally used to model the number of events occurring within a given time interval
- Is a discrete distribution which takes on the values X = 0, 1, 2, 3,….

In the given question, one has to study the daily admission of head injury patients in a trauma care centre,
Since, it describes the no. of events in time (no. of head injury patients admitted per day,
Therefore, it is a Poisson distribution.

Also Remember

- *Binomial distribution:*
  - Is the 'discrete probability distribution' of the number of successes in a sequence of n independent yes/no experiments, each of which yields success with probability p (Success/Failure experiment)
  - Is also called a Bernoulli experiment or Bernoulli trial: In fact, when n = 1, the binomial distribution is a 'Bernoulli distribution'
  - Is the basis for the popular binomial test of statistical significance

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- *Normal distribution:*
  - Is also known as 'Gaussian distribution' or 'Standard distribution'
  - Is the distribution of values of a quantitative variable such that they are symmetric with respect to a middle value with same mean, median and mode, and then the frequencies taper off rapidly and symmetrically on both sides – 'bell shaped distribution'
- *Uniform distribution:*
  - All values of the distribution are equally probable.
  - Is of 2 types: Discrete and Continuous.

81. Ans. (d) Has variance = 1.0 ***[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p117 Park 23/e p849]***

Normal Distribution:

- Is also known as 'Gaussian distribution' or 'Standard distribution'
- *Type of distribution:* Is the distribution of values of a quantitative variable such that they are symmetric with respect to a middle value with same mean, median and mode, and then the frequencies taper off rapidly and symmetrically on both sides – 'bell shaped distribution'.

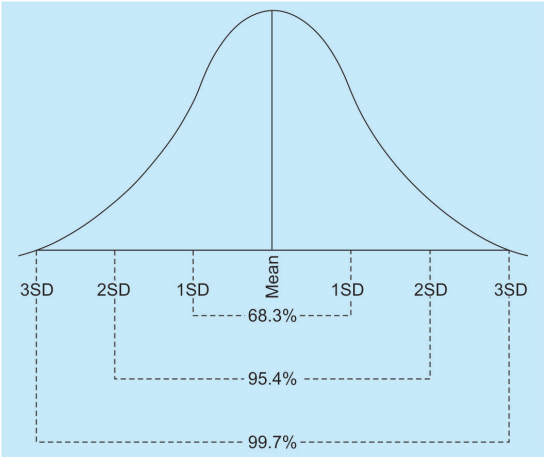

Figure: Normal curve showing distribution of values

- *Normal/ Gaussian curve:*
  - Is 'bilaterally symmetrical, bell-shaped'
  - Is based on Mean & standard deviation
  - Mean, Median and Mode coincide (Mean = Median = Mode)
  - Has Mean (μ) = 0 and SD (σ) = 1
    1. Mean ± 1SD (μ ± 1σ) covers 68% values
    2. Mean ± 2SD (μ ± 2σ) covers 95% values
    3. Mean ± 3SD (μ ± 3σ) covers 99% values
  - In normal distribution, 50% values lie above mean & 50% below mean.

Also Remember

- SD = i.e. σ = OR Variance = σ^2
  - In Normal distribution, SD(σ) = 1, thus Variance = 1
- Normal range: Is the range of Mean ± 2SD (μ ± 2σ)
- Inflections in a Normal curve: Central part is convex, while at the points of inflection, the curve changes from convexity to concavity
  - Perpendicular from point of inflection will cut he base at distance of 1SD (1σ) from mean (μ) on either side

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- Asymmetrical distributions:
  - *Right (positive) skew:* Mean > Median > Mode

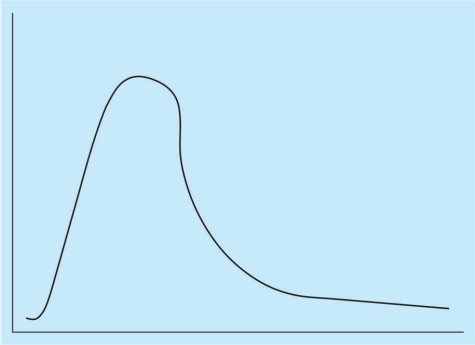

Figure: Right skew curve

- *Left (negative) skew:* Mean < Median < Mode

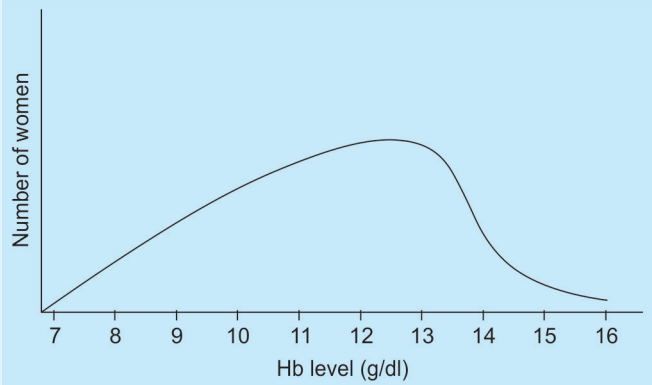

Figure: Distribution of under-nourished and women

- *Bimodal curve:* Has two peaks (modes)

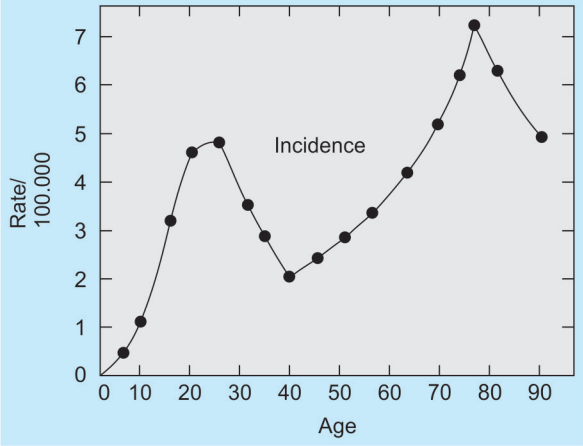

Figure: Bimodality in Hodgkin's disease

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82. Ans. (c) Mean and standard deviation *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p117 and Methods in Biostatistics by Mahajan, 7/e p72-77; Park 23/e p849]*

- *Normal/Gaussian curve:*
  - Is 'bilaterally symmetrical, bell-shaped'
  - Is based on mean (μ) and standard deviation (σ)
  - Mean, Median and Mode coincide (Mean = Median = Mode)
  - Has Mean (μ) = 0 and SD (σ) = 1
    1. Mean ± 1SD (μ ± 1σ) covers 68% values
    2. Mean ± 2SD (μ ± 2σ) covers 95% values
    3. Mean ± 3SD (μ ± 3σ) covers 99% values
  - In a Normal distribution, 50% of values lie above the mean and 50% lie below the mean.

Also Remember

- *Normal range:* Mean ± 2SD (μ ± 2σ) which covers 95% values
- *Actual parameters in a Normal (Gaussian) distribution:*
  - Mean ± 1SD (μ ± 1σ) limits include 68.27% values
  - Mean ± 2SD (μ ± 2σ) limits include 95.45% values
  - Mean ± 1.96SD (μ ± 1.96σ) limits include 95% values
  - Mean ± 3SD (μ ± 3σ) limits include 99.73% values
  - Mean ± 2.58SD (μ ± 2.58σ) limits include 99% values
- Values that differ from the mean by more than 2SD are rare, being only 4.55%
- Values higher or lower than the Mean ± 3SD (μ ± 3σ) are very rare, being only 0.27%
- 6 SD (3 on either side of mean) cover almost the entire range of a variable character
  - SD divides the range into 6 equal sub-ranges
- Minimum sample size required for establishment of normal range for any health parameter: 300 healthy subjects.

83. Ans. (b) 85 and 125 mgs *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p117 and Methods in Biostatistics by Mahajan, 7/e p72-77; Park 23/e p849]*

In the given question, the fasting blood levels of glucose for a group of diabetics is found to be normally distributed with a mean of 105 mg per 100 ml of blood and a standard deviation of 10 mg per 100 ml of blood,
Thus, Mean (μ) = 105 mg/dl and SD (σ) = 10 mg/dl
95% of diabetics will have their fasting blood glucose levels within the limits of Mean ± 2SD (μ ± 2σ)
i.e. within 105 ± 2(10) or between 85 – 125 mg per 100 ml.

84. Ans. (a) 95% of all children weight between 12 and 18 kg *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p117 and Methods in Biostatistics by Mahajan, 7/e p73]*

In the given question, n = 100 children, Mean weight (μ) =15 kg, SD = 1.5 kg,
95% of value are contained in Mean ± 2SD (μ ± 2σ),
Thus 95% of all children will have weight between 15 ± 2 (1.5) i.e. between 12 and 18 kg.

85. Ans. (a) Shows a 'bath tub distribution' *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p104-05 and Methods in Biostatistics by Mahajan, 7/e p72-79; Park 23/e p849]*

Also Remember

- *Bath tub distribution:*
  - Is a distribution where the curve shows trough (depression) in the middle instead of peak.
  - Example: No. of deaths in various age groups in India (Deaths in India are high in infancy and above the age of > 50 years).

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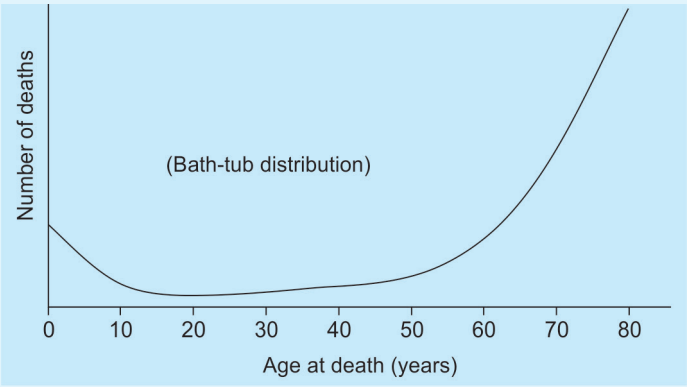

Figure: Bath tub distribution

86. Ans. (a) Less than median *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p111]*

- *Central tendency in various distributions:*

Distribution	Central tendency
Normal (Gaussian) distribution	Mean = Median = Mode (coincide)
Right (Positive) skew distribution	Mean > Median > Mode
Left (Negative) skew distribution	Mean < Median < Mode

- *In distribution with extreme values (Outliers):*
  - *Most affected measure of central tendency:* Mean
  - *Least affected measure of central tendency:* Mode
  - *Most preferable measure of central tendency:* Median

87. Ans. (d) Nothing can be said conclusively *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p35-36 and Methods in Biostatistics by Mahajan, 7/e p77-79; Park 23/e p847-849]*

- In a normal distribution, Mean (μ) = 0 and SD (σ) = 1
- In a right (positive) skew, Mean > Median > Mode
- In a left (negative) skew, Mean < Median < Mode

In the given question, Mean = 3.0 mmol/litre and Standard deviation = 3.0 mmol/litre,
Thus nothing can be said conclusively.

88. Ans. (b) 150 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p112-13 and Methods in Biostatistics by Mahajan, 7/e p45; Park 21/e p787-88, Park 22/e p791-92]*

- *Quartile:* Divides a distribution into 4 equal parts, so the number of intercepts required will be 3, i.e. Q_1, Q_2, Q_3
  - So, Zero – Q_1 covers 25% values
  - Similarly, $Q_2 - Q_1$, $Q_3 - Q_2$ and 100 – Q_3 all cover 25% values each
  - Thus, Q_2 – Zero, 100 – Q_2 and $Q_3 - Q_1$ all cover 50% values each
  - Q_1 divides a distribution in a ratio of 25 : 75 OR 1 : 3
  - Q_2 divides a distribution in a ratio of 50 : 50 OR 1 : 1, Thus second quartile is equivalent to median
  - Q_3 divides a distribution in a ratio of 75 : 25 OR 3 : 1

In the given question, n = 300, Q_3 = 4.5 litres and Q_1 = 1.5 litres
Thus $Q_3 - Q_1$ will cover 50% values, i.e. 50% of 300 = 150 values.

89. Ans. (a) 28 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p117 and Methods in Biostatistics by Mahajan, 7/e p73; Park 23/e p849]*

In the given question, Mean (μ) = 30 mm and SD (σ) = 1.0 mm
Thus, 95% values are contained in the range of Mean ± 2 SD (μ ± 2σ) or 30 ± 2 (1)
So, 95% values are contained in the range 30 – 2 mm and 30 + 2 mm OR between 28 and 30 mm.

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90. Ans. (b) 95% *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p117-19 and Methods in Biostatistics by Mahajan, 7/e p73; Park 23/e p849]*

- *In a Normal (Gaussian) distribution:*
  - Mean ± 1SD (μ ± 1σ) limits include 68.27% values
  - Mean ± 2SD (μ ± 2σ) limits include 95.45% values
  - Mean ± 1.96SD (μ ± 1.96σ) limits include 95% values
  - Mean ± 3SD (μ ± 3σ) limits include 99.73% values
  - Mean ± 2.58SD (μ ± 2.58σ) limits include 99% values
- Values that differ from the mean by more than 2SD are rare, being only 4.55%
- Values higher or lower than the Mean ± 3SD (μ ± 3σ) are very rare, being only 0.27%
- 6 SD (3 on either side of mean) cover almost the entire range of a variable character
  - SD divides the range into 6 equal sub-ranges
- Minimum sample size required for establishment of normal range for any health parameter: 300 healthy subjects.

91. Ans. (c) Negatively skewed *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p111]*
In the given question, mean systolic blood pressure in a population (130 mm Hg) is less than median (140 mm Hg), Thus distribution is Left (Negative) skew distribution.

92. Ans. (c) Left-skewed *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p111]*

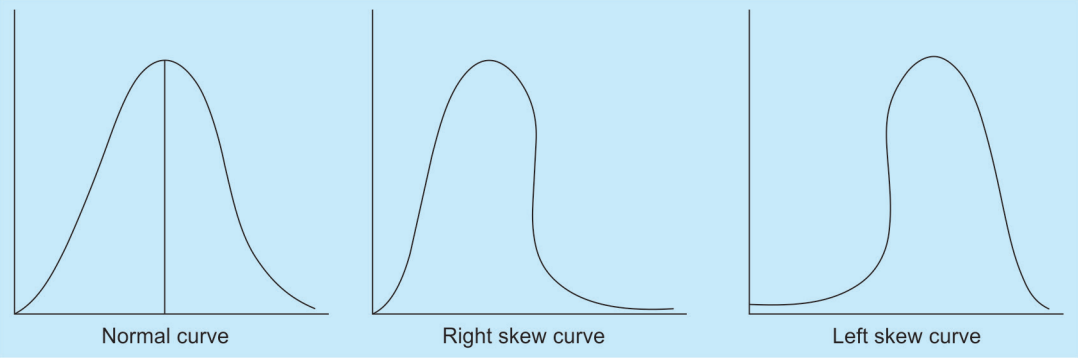

Figure: Central tendency

In the given question, Mean = 20, Median = 24 & Mode = 26
Thus Mean < Median < Mode, making it a Left (Negative) skew distribution.

93. Ans. (b) 50 *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p105 and Methods in Biostatistics by Mahajan, 7/e p73; Park 23/e p847]*
In the given question
- Mean glucose (μ) = 86 mg/dL,
- Thus, 50% of people will have glucose above 86 mg/dL and 50% of people will have glucose below 86 mg/dL.

Also Remember

- Statistical tests based on Gaussian distribution are known as 'Parametric tests'
  - Student's t - test
  - ANOVA - F test

94. Ans. (b) 50 *[Ref. Simple Biostatistics by Indrayan and Indrayan, 1/e p117 and Methods in Biostatistics by Mahajan, Park 23/e p847]*
In the given question, Mean Systolic blood pressure (SBP) = 120 mm Hg,
So 50% of values (50% of n) i.e. 50 individuals will have their SBP below 120 mm Hg, and a similar no. will have value of SBP above 120 mm Hg.

95. Ans. (a) About 95% of the girls have PEFR between 260 and 340 l/min *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p117 Park 23/e p849]*

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- *In Normal distribution,*
  - Mean ± 1SD (μ ± 1σ) covers 68% values
  - Mean ± 2SD (μ ± 2σ) covers 95% values
  - Mean ± 3SD (μ ± 3σ) covers 99% values

In the given question,

- Mean of PEFR (μ) = 300 l/min
- Standard deviation of PEFR (σ) = 20 l/min

Thus,

- 68% of girls will have PEFR in the range Mean ± 1SD (μ ± 1σ) = 300 ± 20 l/min, i.e. between (300 – 20) and (300 + 20) l/min
  - 280 – 320 l/min range covers 68% of girls
- 95% of girls will have PEFR in range Mean ± 2SD (μ ± 2σ) = 300 ± 2(20) l/min, i.e. between (300 – 40) and (300 + 40) l/min
  - 260 – 340 l/min range covers 95% of girls
- 99% of girls will have PEFR in range Mean ± 3SD (μ ± 3σ) = 300 ± 3(20) l/min, i.e. between (300 – 60) and (300 + 60) l/min
  - 240 – 360 l/min range covers 99% of girls
- Now, 260 – 340 l/min range covers 95% of girls, thus rest 5% of girls are outside this range, i.e. they have PEFR either < 260 l/min or > 340 l/min
  - Even this will be symmetrically distributed (Normal curve is bilaterally symmetrical), thus
    1. 2.5% girls will have PEFR < 260 l/min
    2. 2.5% girls will have PEFR > 340 l/min
  - Girls having PEFR less than 340 l/min: 97.5%
- Since the normal range of PEFR for girls is not given in the question, it cannot be concluded that all girls have healthy lungs.

Also Remember

- In a Normal distribution, 50% of values lie above the mean and 50% lie below the mean
  - In the given question,
    1. 50% of girls will have PEFR > 300 l/min
    2. 50% of girls will have PEFR < 300 l/min
- In a Normal distribution, Mean ± 1SD (μ ± 1σ) covers 68% values, so 32% of girls are outside this range
  - Even this will be symmetrically distributed (Normal curve is bilaterally symmetrical), thus in the given question,
    1. 16% girls will have PEFR < 280 l/min
    2. 16% girls will have PEFR > 320 l/min
- In a Normal distribution, Mean ± 3SD (μ ± 3s) covers 99% values, so 1% of girls are outside this range
  - Even this will be symmetrically distributed (Normal curve is bilaterally symmetrical), thus in the given question
    1. 0.5% girls will have PEFR < 240 l/min
    2. 0.5% girls will have PEFR > 360 l/min

96. Ans. (b) Mean = Median *[Ref. Park 23/e p847]*

97. Ans. (a) Mean, median and mode are same; (b) B/L symmetrical (c) Bell shape *[Ref. Park 23/e p847-849]*

98. Ans. (b) The curve is bilaterally symmetrical; (e) Mean, Median and Mode coincide *[Ref. Park 23/e p849]*

99. Ans. (a) Normal *[Ref. Simple Biostatics by Indrayan & Indrayan, 1/e p 115-16]*

100. Ans. (a) Mean-Mode/SD *[Ref. Quantitative methods by TR Jain and AS Sandhu, Latest ed., 2009-10, p3.4]*

SKEWNESS:

- Is measure of asymmetry of a probability distribution of a random variable
- Measures of skewness:
  - Pearson's mode or First Skewness coefficient = (Mean – Mode)/SD
  - Pearson's median or Second Skewness coefficient = 3(Mean – Median)/SD
  - Quartile skewness = $(Q_3 - 2Q_2 + Q_1)/Q_3 - Q_1$.

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101. (c) 95% *[Ref. K. Park 23/e p849]*
In the given question, n = 100, Mean = 105 marks, SD = 10 marks
So, Mean ± 1SD = 105 ± 10 = 95-115 marks covers 68% students
Mean ± 2SD = 105 ± 20 = 85-125 marks covers 95% students, and
Mean ± 3SD = 105 ± 30 = 75-135 marks covers 99% students.

102. Ans. (a) Outliers *[Ref. Basic Statistics and Pharmaceutical Statistical Applications by JED Muth, 1/e p534]*
DIXON'S Q-TEST
- *Use:* To find out and eliminate outlier from a distribution
- *Method:* Measure the difference between a suspect value and next closest value, and THEN compare it with total range of observations
- Alternative method to detect outliers: Grubb's T procedure

103. Ans. (a) Mean = median *[Ref. K. Park 23/e p847]*

104. Ans. (b) Mean < Mode *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p111]*

105. Ans. (b) 7.31 gm/dL *[Ref. Park 23/e p849]*
- Mean ± 1SD covers 68% values; So, Hb of 68% pregnant females will lie between 10.6 ± 2 gm/dL or between 8.6-12.6 g/dL
  - So, 16% will lie below 8.6 gm/dL
- Similarly, Mean ± 2SD covers 95% values; So, Hb of 95% pregnant females will lie between 10.6 ± 2(2) gm/dL or between 6.6-14.6 gm/dL
  - So, 2.5% will lie below 6.6 gm/dL
- So 5% pregnant females will have Hb below 7.31 gm/dL (most appropriate answer)

106. (d) Sampling distribution *[Ref. Research Design and Methods by Bordens, 6/e p392]*
- *Sample distribution*: A distribution resulting from the collection of actual data, after drawing a sample from the population
  - A major characteristic of a sample is that it contains a finite (countable) number of scores
- *Population distribution*: A distribution made up of all the classes or values of variables which we would observe if we were to conduct a census of all members of the population
- *Sampling distribution*: Sampling distribution is a distribution of a sample statistic
  - It is a model of a distribution of scores, like the population distribution, except that the scores are not raw scores, but statistics
  - If we draw a number of samples from the same population, then compute sample statistics for each, we can construct a distribution consisting of the values of the sample statistics we've computed
  - This is a kind of "second-order" distribution
  - Whereas the population distribution and the sample distribution are made up of data values, the sampling distribution is made up of values of statistics computed from a number of sample distributions

Review Questions

107. Ans. (a) 68% *[Ref: Park 23/e p849]*

108. Ans. (c) 95% *[Ref: Park 23/e p849]*

109. Ans. (a) Mean = median *[Ref: Park 23/e p847]*

110. Ans. (d) Mean and Median = 1 *[Ref. Park 23/e p847]*

111. Ans. (b) 95.4% *[Ref: Park 23/e p849]*

112. Ans. (a) Standard deviation and mean *[Ref. Park 23/e p847-848]*

SAMPLING

113. Ans. (d) Desired precision *[Ref. Clinical Epidemiology by Fletcher, p177-78]*
- *Sample size depends upon:*
  - the effect size (usually the difference between 2 groups)

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- the population standard deviation (for continuous data)
- the desired power of the experiment to detect the postulated effect (Power = 1 – β)
- the significance level (α).

114. Ans. (d) 12-23 months *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p35-36 and Methods in Biostatistics by Mahajan, 7/e p91]*

CLUSTER RANDOM SAMPLING (CRS)

- Applicable when units of population are natural groups or clusters
- Use of CRS in India: Evaluation of immunization coverage
- WHO technique used in CRS: 30 × 7 technique (total = 210 children)
  - 30 clusters, each containing
  - 7 children who are 12 – 23 months age and are completely immunized for primary immunization (till Measles vaccine)
- Clusters are heterogeneous within themselves but homogenous with respect to each other
- Sampling interval is also calculated in CRS
- Accuracy: Low error rate of only ± 5%
- Limitation: Clusters cannot be compared with each other.

Also Remember

- Main objective of cluster sampling is to reduce costs by increasing sampling efficiency; this contrasts with stratified sampling where the main objective is to increase precision.

115. Ans. (d) 12-23 months *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p35-36 and Methods in Biostatistics by Mahajan, 7/e p91]*

116. Ans. (d) Cluster sampling *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p35-36 and Methods in Biostatistics by Mahajan, 7/e p91]*

117. Ans. (d) Cluster testing *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p34-37 and Methods in Biostatistics by Mahajan, 7/e p91]*

- *Types of sampling:*

	Random Sampling	Non-random sampling
Synonyms	Probability sampling	Non-probability sampling
	Non-purposive sampling	Purposive sampling
Types	Simple random sampling	Convenience sampling
	Systematic random sampling	Quota sampling
	Stratified random sampling	Snow-ball sampling
	Multistage random sampling	Clinical trial sampling
	Multiphase random sampling	
	Cluster random sampling	

Refer to Theory.

118. Ans. (d) The drop-out rate increases *[Ref. Internet]*

119. Ans. (d) Stratified random sampling *[Ref. K. Park 23/e p880]*

Refer to Theory.

120. (a) Sample size same as simple random *[Ref. Methods in Biostatistics by Mahajan, 7/e p91]*

- *Cluster random sampling:*
  - Sample size (total 210): Is much smaller than that of random sampling
  - Is a 2-satge sampling procedure:
    1. First stage: Choosing 30 clusters in an area
    2. Second stage: Choosing 12-23 months children (7 in each cluster)
  - Cheaper quick method: Lesser time, lesser population coverage, lesser sample size.

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121. Ans. (d) Cluster random sampling *[Ref. Designing and Conducting Health Surveys: A Comprehensive Guide, p175]*

DESIGN EFFECT

- *Definition:* Adjustment used in few study/sampling designs to allow for design structure, especially to allow for correlations among cluster of observations
- *Uses:*
  - Cluster randomised trials
  - Cluster random sampling
  - Multistage sampling
  - Health facility cluster survey

122. Ans. (d) 400 *[Ref. Applied Statistics in Health Sciences by Rao & Murthy, 1/e p105]*

- Minimum sample size for prevalence calculation in Cross-sectional studies (Field surveys):

Sample size = $4pq/L^2$

Where, p= prevalence; q=1-p; l=error in estimation of prevalence

In the given question, p = 50% (50/100); q = 1-p = 1-0.50 = 0.50 (50/100); L=5% (5/100 as range permissible is 45-50% i.e. +5%)

So, Sample size = $[4*50/100*50/100]/ [5/100]^2 = 400$

123. Ans. (c) Homogenous population *[Ref. K Park 23/e p850]*

124. Ans. (a) Heterogenous data *[Ref. K Park 23/e p850]*

125. Ans. (d) 30 cluster of 7 children *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p35-36]*

126. Ans. (d) Multistage sampling *[Ref. The Practice of Social Research by E Babbie, 12/e p218]*

127. Ans. (d) 5 *[Ref. Ordinal Data Modelling by VE Johnson, 1/e p107]*

128. Ans. (a) Quota sampling *[Ref. K Park 23/e p850]*

129. Ans. (c) Systematic random sampling *[Ref. Park 23/e p850]*

Review Questions

130. Ans. (b) Equal chance to each for collection of certain number for a sample *Ref. Park 23/e p792-93]*

131. Ans. (d) Cluster-30 *[Ref. Textbook of Community Medicine by A P Kulkarni and Baride, 2/e p209]*

PROBABILITY AND ODDS

132. Ans. (a) Prior probability of SLE; sensitivity and specificity of each test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p107-08]*

- PPV is also known as 'post-test probability of a disease' or 'precision rate'
- *Baye's Theorm:* Gives relationship between PPV of a screening test and Sensitivity, Specificity & Prevalence of disease in a population

$$PPV = \frac{\text{Sensitivity} \times \text{Prevalence}}{[\text{Sensitivity} \times \text{Prevalence}] + [(1 - \text{Specificity})(1 - \text{Prevalence})]} \times 100$$

- *Actual Baye's Theorm:* Gives relationship between Post-test probability of a disease in a population (PTP = PPV) and Sensitivity, Specificity & Post-test probability of a disease in a population (pTP = Prevalence)
  - Post-test probability of a disease in a population (pTP) IS SAME AS PPV
  - Pre-test probability of a disease in a population (pTP) IS SAME AS Prevalence.

In the given question, a patient is clinically diagnosed as having SLE and ordered 6 tests; out of which 4 tests have come positive and 2 are negative;

Thus, to determine the probability of SLE at this point (Post-test probability of SLE OR PPV), one would need to know Prior probability of SLE (Pre-test probability OR Prevalence of SLE); sensitivity and specificity of each test.

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Also Remember

- *Positive predictive value (PPV):* Ability of a screening test to identify correctly all those who have the disease, out of all those who test positive on a screening test

$$PPV = \frac{a}{a+b} \times 100 = \frac{TP}{TP+FP} \times 100$$

  - *PPV of a screening test depends on:*
    - Sensitivity
    - Specificity
    - Prevalence of disease in the population
  - PPV of a screening test is directly proportional to prevalence of disease in the population.

133. Ans. (c) 0.001 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p106-07 and Methods in Biostatistics by Mahajan, 7/e p95-100]*

- *Probability:* Is the chance that some event will occur
- *Probability range:* 0 to +1 (0% to 100%)
  - Probability can never be zero
  - Probability cannot exceed one
- *Probability rules:*
  - Rule of addition: Probabilities are added for mutually exclusive events i.e. P(Total) = P(A) + P(B)
  - Rule of multiplication: Probabilities are multiplied for obtaining joint occurrence of two or more independent events i.e. P(Total) = P(A) × P(B)

In the given question, Prevalence diabetes in a population is 10%,
Thus each individual has a probability of having diabetes P(A) = 10% = 0.10
If three people selected at random from the population, then each will have a probability of having diabetes as P(A) = 0.10
As all 3 events are independent of each other, so probability of all 3 having diabetes will be

$$P(T)_1 = P(A) \times P(A) \times P(A) = 0.10 \times 0.10 \times 0.10 = 0.001\ (0.1\%)$$

Also, the probability of either one of them having diabetes will be

$$P(T)_2 = P(A) + P(A) + P(A) = 0.30\ (30\%).$$

134. Ans. (d) 0.0256 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p105-07]*

In the given question, Chance of passing a Genetic disease 'y' trait by the affected parents to children is 0.16 and they plan to have two children,
Probability of 1st child having 'y' trait, P(A) = 0.16 (16%)
Probability of 2nd child having 'y' trait, P(B) = 0.16 (16%)
Thus, Probability of both the children having 'y' trait (both events are independent of each other) is
$P(Total)_1 = P(A) \times P(B)$
$P(Total)_1 = 0.16 \times 0.16 = 0.0256\ (2.56\%)$
Also,
Probability of 1st child not having 'y' trait, P(C) = 0.84 (84%)
Probability of 2nd child not having 'y' trait, P(D) = 0.84 (84%)
Thus, Probability of both the children not having 'y' trait (both events are independent of each other) is
$P(Total)_1 = P(C) \times P(D)$
$P(Total)_2 = 0.84 \times 0.84 = 0.7056\ (70.56\%)$
Also, probability of having 1st child with 'y' trait and 2nd child without 'y' trait (both events are independent of each other) will be:
$P(Total)_3 = P(A) \times P(D)$
$P(Total)_3 = 0.16 \times 0.84 = 0.1344\ (13.44\%)$
Also, probability of having 1st child without 'y' trait and 2nd child with 'y' trait (both events are independent of each other) will be:
$P(Total)_4 = P(B) \times P(C)$
$P(Total)_4 = 0.16 \times 0.84 = 0.1344\ (13.44\%)$
Total probability = $P(Total)_1 + P(Total)_2 + P(Total)_3 + P(Total)_4$
P (Total) = 0.0256 + 0.7056 + 0.1344 + 0.1344 = 1.0 (100%), These are the only four possibilities with both child births.

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135. Ans. (b) 0.70 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p105-07]*

In the given question, for Mrs Rekha, probability of having a baby of BW < 2500 gms, P(A) is 0.50 and of having a BW 2500-2999 gms, P(B) is 0.20

Thus, the probability for Mrs. Rekha to have a baby of BW < 3 kg is

$$P(Total) = P(A) + P(B) = 0.50 + 0.20 = 0.70\ (70\%)$$

There is one more possibility, i.e. probability of having a baby of BW > 3 kg, whose probability P(C) will be 1 – (P(A) + P(B)) = 0.30 (30%).

136. Ans. (b) 3:1 *[Ref. CMDT, 41/e p1676]*

Also Remember

- Odds: Odds are the chance of frequency of occurrence of a characteristic relative to its non-occurrence (expressed as a ratio of occurrence to non-occurence)
  - Odds = Probability/(1 – Probability)
  - Probability = Odds/(1 + Odds)

137. Ans. (a) Prob (A or B) = Prob (A) + Prob (B) *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p105-07]*

- Probability: Is the chance that some event will occur
- Probability range: 0 to + 1 (0% to 100%)
  - Probability can never be zero
  - Probability cannot exceed one
- Probability rules:
  - Rule of addition: Probabilities are added for mutually exclusive events i.e. P(Total) = P(A) + P(B)

For example, If probability of having birth weight < 2500 grams (P (A)) is 0.50 (50%), birth weight 2500 – 2999 grams (P(B)) is 0.30 (30%) and birth weight ≥ 3 kg (P (C)) is 0.20 (20%),

Then,

Probability of having birth weight < 3 kg (P (T1)) will be

$$P(T1) = P(A) + P(B) = 0.50 + 0.30 = 0.80\ (80\%)$$ as both events are mutually exclusive

Similarly, probability of having birth weight > 2500 (P (T2)) will be

$$P(T2) = P(B) + P(C) = 0.30 + 0.20 = 0.50\ (50\%)$$ as both events are mutually exclusive

- Rule of multiplication: Probabilities are multiplied for obtaining joint occurrence of two or more independent events i.e. P(Total) = P(A) × P(B).

For example,

If probability of having birth weight < 3 kg (P (C)) is 0.70 (70%),

Probability of having birth weight ≥ 3 kg (P (D)) is 0.30 (30%) AND

Probability of being of male sex (P (E)) is 0.50 (50%), and probability of being of female sex (P (F)) is 0.50 (50%).

Then,

Probability of having a child with birth weight < 3 kg and of male sex will be

$$P(T_3) = P(C) \times P(E) = 0.70 \times 0.50 = 0.35\ (35\%)$$ as both are independent events

Similarly, Probability of having a child with birth weight < 3 kg and of female sex will be

$$P(T_4) = P(C) \times P(F) = 0.70 \times 0.50 = 0.35\ (35\%)$$ as both are independent events

Probability of having a child with birth weight ≥ 3 kg and of male sex will be

$$P(T_5) = P(D) \times P(E) = 0.30 \times 0.50 = 0.15\ (15\%)$$ as both are independent events

Probability of having a child with birth weight ≥ 3 kg and of female sex will be

$$P(T_6) = P(D) \times P(F) = 0.30 \times 0.50 = 0.15\ (15\%)$$ as both are independent events

Total probability of a child being borne with any characteristic (P (T)) will be

$$P(T) = P(T_3) + P(T_4) + P(T_5) + P(T_6) = 0.35 + 0.35 + 0.15 + 0.15 = 1\ (100\%)$$

Odds: Odds are the chance of frequency of occurrence of a characteristic relative to its non-occurrence (expressed as a ratio of occurrence to non-occurence).

$$\text{Odds} = \frac{\text{Probability}}{1 - \text{Probability}}$$

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$$\text{Probability} = \frac{\text{Odds}}{1+\text{Odds}}$$

For example, if probability of occurrence of CHD in a man in lifetime is 0.75 (75%) i.e. P (CHD),
Then odds of CHD development in lifetime will be,
P (CHD)/ (1 – P (CHD)) = 0.75/ (1 – 0.75) = 0.75/ 0.25 = 3 (3 : 1).

Review Questions

138. Ans. (a) 2/6 *[Ref: Park 20/e p755]*

139. Ans. (d) 1 in 20 [1 in 40 is Better Answer] *[Ref. Indrayan, 1/e p105-07]*

STATISTICAL TESTS

140. Ans. (c) Paired t-test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p164 and Methods in Biostatistics by Mahajan, 7/e p134]*

TESTS OF STATISTICAL SIGNIFICANCE

	Parametric tests	Non-parametric tests
Based on	Gaussian/Normal distributions	Non – normal distributions
Type of data	Quantitative	Qualitative
Compares	Means (± SD)	Percentage, proportions & fraction
Examples	Students (paired) t - test	Sign test
	Students (unpaired) t - test	Chi-square test (c2 - test)
	ANOVA F - test	Wilcoxan test (signed rank)
		Wilcoxan test (rank sum)

- *Student's t -test:*
  - *Paired Student's t-test:* Comparing means (± SD) in paired data (in same group of individuals before and after an intervention)

Example: Mean serum albumin level of dengue patients before treatment was 3.6 g/dL and after treatment was 3.2 g/dL; Comparison of mean levels can be done by Paired Student's t-test.

  - *Unpaired Student's t-test:* Comparing means (± SD) in two different group of individuals

Example: Mean Hb level of anemia patients was 9.6 g/dL and those of hookworm patients was 7.2 g/dL; Comparison of mean levels can be done by Unpaired Student's t-test

  - *Z - test:* Is a variant of student's t-test which is used when sample size is > 30
- *ANOVA test (F-test/F-ratio):* Comparing means (± SD) in more than two different group of individuals

*Example: Mean weight of students in class A is 50 kg, those of class B is 44.6 kg and those of class C is 52.7 kg; Comparison of mean weights can be done by ANOVA test

- *Sign test:* Comparing percentage, proportions & fractions in paired data (in same group of individuals before and after an intervention)

*Example: 30% of students in a class are anaemic, after 6 months of IFA therapy, now 20% of students are anaemic; Test of significance to be applied is Sign test

- *Chi-square test ($\chi 2$ – test):* Comparing percentage, proportions & fractions in two or more different group of individuals
  - Example: Three-fourth of students in a class are underweight whereas another class has two-thirds anaemic; test of significance to be used is Chi-square test
  - *Fischer's test:* Is a variant of Chi-square test when sample size is < 30
- *Wilcoxon (signed rank) test:* Comparing percentage, proportions & fractions in matched paired data
- *Wilcoxon (rank sum) test*: Comparing percentage, proportions & fractions in two unpaired samples

In the given question, variation in cholesterol was seen before and after giving a drug. Thus comparison of mean (cholesterol levels) is done in paired data for which Paired Student's t-test is done.

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- *Mann-Whitney (Wilcoxon) test:*
  - MWW is same as Wilcoxon (rank sum) test
  - Is used for assessing whether two set of observations come from same distribution (if 2 independent 'non-paired' samples come from the same population)
  - 'MWW is analogous to parametric two-sample t-test' on the data after ranking over the combined samples
  - MWW requires calculation of 'U statistic'.

141. Ans. (c) Standard error of difference between two proportions *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p146-47 and Methods in Biostatistics by Mahajan, 7/e p149; Park 23/e p851]*

Also Remember

- *Mean (Average):*
  - Is a measure of central tendency
  - Is obtained as sum of all values divided by the no. of values

  Mean = $\Sigma x/n$
- *Normal deviate:*
  - Is also known as Z score (Standard score)
  - Is difference of a value from group mean, in terms of how many times of SD (σ)

  $$\text{Z score} = \frac{\text{Individual level–Mean}}{\text{SD}} = \frac{x - \mu}{\sigma}$$
- The standard score indicates how many standard deviations an observation is above or below the mean
- Z scores are frequently used in assessing how far a child is in his relative growth to a standard
- Z score = 2: Any measurement of atleast 2SD away is considered too far away to be normal.

142. Ans. (a) Paired t-test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p164 and Methods in Biostatistics by Mahajan, 7/e p134]*

- In the given question, a cardiologist wants to study the effect of an atrovastatin drug; he notes down the initial cholesterol levels of 50 patients and then administers the drug on them and after a month's treatment, he measures the cholesterol level again
- Since mean cholesterol levels are being measured in the same group of individuals before and after an intervention, this is PAIRED DATA
- Thus, the most appropriate to test the statistical significance of the change in blood cholesterol will be Students (paire(d) t-test.

Also Remember

- *Mann-Whitney (Wilcoxon) test:*
  - MWW is same as Wilcoxon (rank sum) test
  - Is used for assessing whether two set of observations come from same distribution (if 2 independent 'non-paired' samples come from the same population)
  - 'MWW is analogous to parametric two-sample t-1test' on the data after ranking over the combined samples
  - MWW requires calculation of 'U statistic'.

143. Ans. (b) That a smaller proportion of people who were immunized against chickenpox subsequently develop zoster than those who were not immunized *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p170-72 and Methods in Biostatistics by Mahajan, 7/e p154-169; Park 21/e p791, Park 22/e p795]*

In the given question,

- Choice (a): Mean score of 2 groups are compared, thus most appropriate test of significance would be 'Unpaired Students t-test'
- Choice (b): Two proportions are compared, thus most appropriate test of significance would be 'Chi-square test'
- Choice (c): Mean score of 3-4 groups are compared, thus most appropriate test of significance would be 'ANOVA (F ratio) test'
- Choice (d): Mean score of 2 groups are compared, thus most appropriate test of significance would be 'Unpaired Students t-test'

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144. Ans. (a) Chi-square test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p170-72 and Methods in Biostatistics by Mahajan, 7/e p154-169; Park 23/e p852]*

CHI-SQUARE TEST (χ^2 – TEST):

- Is a 'non-parametric test' of significance
- Is used to 'test significance of association between 2 or more qualitative characteristics'
- Is used to compare proportions in 2 or more groups
- Is used for non – Normal (non –Gaussian) distributions
- *Applications of Chi-square test:*
  - Test of proportions
  - Test of association
  - Test of goodness of fit
- *Essential requirements for calculation of Chi-square test:*
  - Random sample
  - Qualitative data
  - Lowest expected frequency not < 5

In the given question, in a particular trial, the association of lung cancer with smoking is found to be 40% in one sample and 60% in another, Sincw two proportions are to be compared best test will be Chi-square test.

Also Remember

- *Degree of freedom:* Is the no. of observations in a dataset that can freely vary once the parameters have been estimated
  - Used in Chi-square test and t-test
    1. In a contingency table, dof = (c – 1) (r – 1) (where c = no. of columns and r = no. of rows)
    2. In a Student's t-test (one-sample data/ paired test), dof v = n – 1 (where n = no. of units in the sample)
    3. In a Student's t –test (two-sample data/unpaired test), dof v = (n1 + n2) – 1 (where n1 and n2 = no. of units in the two samples)
- *Paired Student's t-test:* Comparing means (± SD) in paired data (in same group of individuals before and after an intervention)
- *Fischer's test:* Is a variant of Chi-square test when sample size is < 30
- *ANOVA test (F-test/F-ratio):* Comparing means (± SD) in more than two different group of individuals.

145. Ans. (c) t *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p160-63 and Methods in Biostatistics by Mahajan, 7/e p127-128]*

- *Student's t-test:*
  - Paired Student's t-test: Comparing means (± SD) in paired data (in same group of individuals before and after an intervention)
  - Unpaired Student's t-test: Comparing means (± SD) in two different group of individuals
  - Z-test: Is a variant of student's t-test which is used when sample size is **> 30.**

In the given question, mean ± SD of 20 boys (140 ± 13 cm) and 20 girls (135 cm ± 7cm) of the same age are compared, Thus most appropriate statistical test of significance would be Unpaired Student's t-test.

Also Remember

- *Chi-square test (χ^2 - test):* Comparing percentage, proportions & fractions in two or more different group of individuals
  - Fischer's test: Is a variant of Chi-square test when sample size is < 30
- *ANOVA test (F - test/F -ratio):* Comparing means (± SD) in more than two different group of individuals.

146. Ans. (b) Paired 't' test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p160-63 and Methods in Biostatistics by Mahajan, 7/e p127-128]*

- *Student's t-test:*
  - *Paired Student's t-test:* Comparing means (± SD) in paired data (in same group of individuals before and after an intervention)
  - *Unpaired Student's t-test:* Comparing means (± SD) in two different group of individuals
  - *Z-test:* Is a variant of student's t-test which is used when sample size is > 30.

In the given question, the mean B.P. of a group of persons was determined and after an interventional trial, the mean BP was estimated again. The best test to be applied to determine the significance of intervention would be Paired Student's t-test.

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147. Ans. (d) Chi-Square test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p168-85 and Methods in Biostatistics by Mahajan, 7/e p154-169; Park 21/e p791, Park 22/e p795]*

- Chi-square test as a test of association between 2 events in binomial or multinomial samples is its' 'most important application'

In the given question, an investigator wants to study the association between maternal intake of iron supplements (Yes or No) and incidence of low birth weight (< 2500 or > 2500) gms),
Thus, association is to be studied between 2 qualitative variables, i.e. status of usage of iron supplements and status of low birth weight in their newborns,
So, most appropriate test would be Chi-square test.

148. Ans. (c) 9 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p171 and Methods in Biostatistics by Mahajan, 7/e p159; Park 23/e p852]*

- *Degree of freedom:* Is the no. of observations in a dataset that can freely vary once the parameters have been estimated
  - Used in Chi-square test and t-test
  - In a contingency table,

Degree of freedom, dof = (c – 1) (r – 1)
where c = no. of columns and r = no. of rows

Contingency table	Degree of freedom (dof)
2 × 2 table	(2 – 1) (2 – 1) = 1
3 × 3 table	(3 – 1) (3 – 1) = 4
4 × 4 table	(4 – 1) (4 – 1) = 9
5 × 5 table	(5 – 1) (5 – 1) = 16
3 × 4 table	(3 – 1) (4 – 1) = 6
10 × 20 table	(10 – 1) (20 – 1) = 171

149. Ans. (c) 6 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p171 and Methods in Biostatistics by Mahajan, 6/e p173, 7/e p159; Park 23/e p852]*

- *In a Student's t-test (one-sample data/paired test):*
  Degree of freedom, v = n – 1
  where n = no. of units in the sample
- *In a Student's t -test (two-sample data/unpaired test):*

Degree of freedom, $v = (n_1 + n_2) - 1$
where n_1 and n_2 = no. of units in the two samples.

150. Ans. (a) Paired t-test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p164 and Methods in Biostatistics by Mahajan, 7/e p134]*

In the given question, a cardiologist wants to study the effect of an anti-hypertensive drug. So he will compare mean BP of 50 patients before and after administering the drug. Thus Paired t-test will be most appropriate test of significance.

151. Ans. (b) Student's t-test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p162-63]*

- *Student's t-test:*
  - *Paired Student's t - test:* Comparing means (± SD) in paired data (in same group of individuals before and after an intervention)

Example: Mean serum albumin level of dengue patients before treatment was 3.6 g/dL and after treatment was 3.2 g/dL; Comparison of mean levels can be done by Paired Student's t-test

  - *Unpaired Student's t-test:* Comparing means (± SD) in two different group of individuals

Example: Mean Hb level of anemia patients was 9.6 g/dL and those of hookworm patients was 7.2 g/dL; Comparison of mean levels can be done by Unpaired Student's t-test

  - *Z-test:* Is a variant of student's t-test which is used when sample size is > 30

In the given question, the study to assess the effect of a drug in lowering serum cholesterol levels was undertaken in 15 obese women and 10 non-obese women (2 limbs of the study)
Thus mean lowering of serum cholesterol would be obtained in the two samples, thereby making 'two-sampled student's t –test' as the test of choice.

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152. Ans. (a) Chi-square test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p170 and Methods in Biostatistics by Mahajan, 7/e p154-169; Park 23/e p852]*
In the given question, association of lung cancer with smoking is found to be 40% in one sample and 60% in another. So the best test to compare the results will be Chi square test.

153. Ans. (a) Mean & SD of the groups *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p170-72 and Methods in Biostatistics by Mahajan, 7/e p154-169; Park 23/e p852]*

154. Ans. (b) Student's t-test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p160-64 and Methods in Biostatistics by Mahajan, 6/e p141, 7/e p127]*

Also Remember

- *Odds ratio (OR):* Ratio of odds that cases were exposed to a risk factor to the odds that the controls were exposed
  - Is used to 'measure strength of association in a case control study'
  - Is also known as 'Cross product ratio' or 'Relative odds'
  - Is an 'estimate of Relative risk (RR)', which is used to measure strength of association in a cohort study (RR is more accurate than OR' as a measure of strength of association)
  - OR calculation: Correct table construction in a case control study requires that table will have disease at the top (row) and history of exposure/risk factor on the left (column).

	Disease	
	Present (cases)	**Absent (Controls)**
Exposure present	a	b
Exposure absent	c	d

  - Odds Ratio (Cross Product Ratio) = ad/bc
    - Interpretation of Odds ratio is just like relative risk: OR can be >1 (associated), = 1 (no association) or < 1 (protective effect)
- *Correlation coefficient (r):* Measures the degree or strength of relationship in a correlation
  - Correlation coefficient (r) lies between: –1 to +1 (–1 < r < +1)
  - Correlation is represented by: 'Scatter diagram'
  - Correlation coefficients:
    1. Pearson's Correlation coefficient
    2. Spearman's Rank Correlation coefficient
- *Chi-square test ($\chi 2$ – TEST):*
  - Is a 'non-parametric test' of significance
  - Is used to 'test significance of association between 2 or more QUALITATIVE characteristics'
  - Is used for non – Normal (non –Gaussian) distributions
  - Applications of Chi-square test:
    1. Test of proportions
    2. Test of association
    3. Test of goodness of fit.

155. Ans. (a) Chi-square test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p170 and Methods in Biostatistics by Mahajan, 7/e p154-169; Park 23/e p852]*

156. Ans. (b) 6 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p171 and Methods in Biostatistics by Mahajan, 7/e p159; Park 23/e p852]*
In the given question, there are 3 rows and 4 columns (we only count those rows and columns which are filled with frequencies),
Thus, dof = (c – 1) (r – 1) = (4 – 1) (3 – 1) = 6.

157. Ans. (d) One way analysis of variance (one way ANOVA) *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p164]*
- *Student's t-test:*
  - Paired Student's t-test: Comparing means (± SD) in paired data (in same group of individuals before and after an intervention)
- Comparison of mean levels can be done by Paired Student's t - test
  - Unpaired Student's t-test: Comparing means (± SD) in two different group of individuals

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- ANOVA test (F-test/F-ratio): Comparing means (+ SD) in more than two different group of individuals
- Chi-square test (c2-test): Comparing percentage, proportions & fractions in two or more different group of individuals

In the given question, we have to test the statistical significance of the difference in heights of school children; thus mean heights of schools children in different classes/standards/schools will be done

Thus, ANOVA test (F - test/ F -ratio) is most suitable.

158. Ans. (c) Directly measures the strength of association *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p170-73 and Methods in Biostatistics by Mahajan, 7/e p154-169; Park 23/e p852]*

CHI-SQUARE TEST (χ^2-TEST):

- Is a 'non-parametric test' of significance
- Is used to 'test significance of association between 2 or more qualitative characteristics'
- Is used for non – Normal (non –Gaussian) distributions
- Applications of Chi-square test:
  - Test of proportions
  - Test of association
  - Test of goodness of fit
- Essential requirements for calculation of Chi-square test:
  - Random sample
  - Qualitative data
  - Lowest expected frequency not < 5

In a 2 × 2 contingency table,

a	b
c	d

$\chi^2 = \Sigma (O - E)^2/E$

where O = Observed frequency and E = Expected frequency in each cell

OR $\chi^2 = \frac{[(ab-bc)^2(a+b+c+d)]}{[(a+b)(c+d)(a+c)(c+d)]}$.

Also Remember

- Advantages of χ^2 – test over 'Standard error of difference between two proportions' test as a test of proportions has:
  - Can be used to compare values of 2 binomial samples even if thay are less than size of 30.
    1. Apply correction factor – Yates correction
    2. Expected value must not be < 5 in any cell
  - Can be used to compare frequencies of 2 multinomial samples
- Chi-square test as a test of association between 2 events in binomial or multinomial samples is its' 'most important application'
  - χ^2-test tells about the presence or absence of association between 2 events/characteristics but 'do not tell about strength of association'
  - If strength of association (Relative Risk or Odds Ratio) found in a study is close to value of 1: Chi-square test can be used to find whether or not RR/OR is really statistically significantly different from value of 1.
- If in any cell frequency is < 5: Fischer's exact test is used.

159. Ans. (b) Student t test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p164 and Methods in Biostatistics by Mahajan, 7/e p127-141]*

- In the given question, mean bone density amongst 2 groups of 50 people each is compared,
- Thus means are to be compared in 2 different groups,
- So, Unpaired Student's t-test is most appropriate to test significance of association.

Also Remember

McNemar's Chi-square test: is a non-parametric test used to test significance of association between 2 sampled paired data or for paired nominal data in sample.

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160. **Ans. (b) Paired 't' test** *[Ref. Indrayan, 1/e p164]*

161. **Ans. (b) 6** *[Ref. K. Park 20/e p755; Park 23/e p852]*

162. **Ans. (d) Multiple logistic regression** *[Ref. Principles of Medical Statistics by Alvan R Feinstein, p612]*
    - *ANOVA:* Analysis of Variance is a parametric test used for polyotomous independent variable
    - *Chi-square test:* Is non-parametric test used for testing association between 2 or more qualitative variables
    - *Multiple linear regression:* Is used if the target variables are dimensional having multiple possible values (e.g. blood pressure, serum cholesterol, body temperature)
    - *Multiple logistic regression:* Is used if the target variables are binary having only two possible values (e.g. hypertension, smoking, geriatric age group)

    In the given question, the investigator finds out that 5 independent factors influence the occurrence of a disease. So to compare these 5 factors (each factor being dichotomous) one should use Multiple logistic regression.

163. **Ans. (c) Paired students t-test** *[Ref. Biostatistics by Mahajan, 7/e p134]*

164. **Ans. (a) to (c) SD** *[Ref. Park 23/e p850-852]*

165. **Ans. (d) Chi-square test** *[Ref. Park 23/e p852]*
    - **In the given question,** Significance has to be tested between Receipt of Maternal food supplements (Yes/ No) and Subsequent weights of newborns (Values or Categories), hence Chi-square test would be more appropriate

Review Question

166. **Ans. (a) Significance of difference between two proportions** *[Ref. Park 23/e p852]*

167. **Ans. (a) Measure the significance of difference between two proportion** *[Ref. K.S. Negi Biostatistics p115-117; Park 23/e p852]*

168. **Ans. (b) 1** *[Ref. Park 23/e p852]*

169. **Ans. (c) 3.84** *[Ref. Park 23/e p852]*

170. **Ans. (a) Chi-square test** *[Ref. Park 23/e p852]*

171. **Ans. (a) <0.001 is statistically significant** *[Ref. Park 23/e p852]*

172. **Ans. (a) Unpaired 't' test** *[Ref. K Park 20/e p753-54]*

173. **Ans. (a) Paired 't' test** *[Ref. Indrayan, 1/e p164]*

174. **Ans. (b) 20** *[Ref. K Park 23/e p852]*

175. **Ans. (b) 12** *[Ref. K Park 23/e p852]*

176. **Ans. (b) To compare means in 3 or more groups** *[Ref. Beyond ANOVA by RG Miller, 1/e p5]*

177. **Ans. (c) Means in different groups** *[Ref. K Park 23/e p852]*

178. **Ans. (d) Standard error of difference between proportions** *[Ref. K Park 23/e p851]*

179. **Ans. (a) 1** *[Ref. K Park 23/e p852]*

180. **Ans. (c) 2** *[Ref. K Park 23/e p852]*

181. **Ans. (c) 10** *[Ref. K Park 23/e p852]*

182. **Ans. (d) Cox proportional hazards test** *[Ref. Cholesterol: New Insights by A Acton, 1/e p511]*

183. **Ans. (d) Fischer's exact test; (e) Chi-square test**

CORRELATION AND REGRESSION

184. **Ans. (d) Computational mistake in calculating correlation** *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p127-30 and Methods in Biostatistics by Mahajan, 7/e p171; Park 23/e p852]*

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CORRELATION:

- Is relationship between 2 quantitative or continuous variables
- *Correlation coefficient (r):* Measures the degree or strength of relationship in a correlation
  - Correlation coefficient (r) lies between: –1 to +1 (–1 < r < +1)
- *Correlation is represented by:* 'Scatter diagram'
  - In a scatter diagram, 2 imaginary lines are drawn along the distribution of dots/scatter.

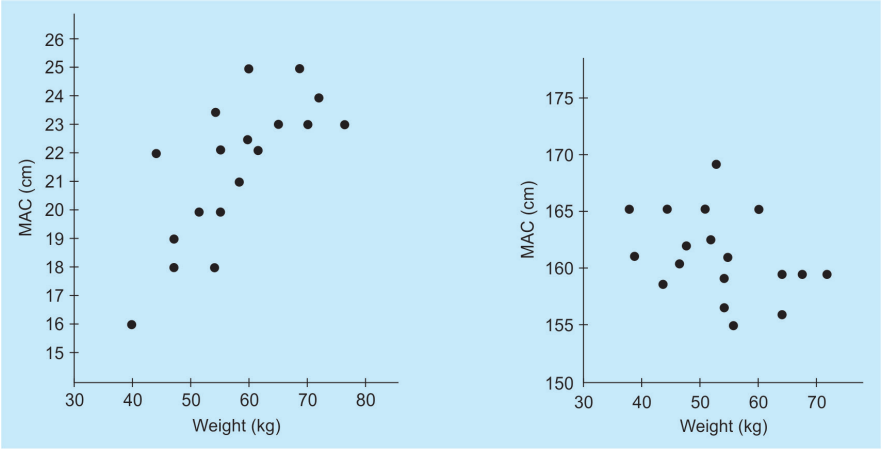

Figure: Scatter showing positive correlation between weight and mix-arm circumference of male medical students

Figure: Scatter diagram showing negative correlation between weight and height of male medial students

- *Correlation coefficients:*
  - Pearson's Correlation coefficient:
    1. Is used in ungrouped series
    2. Is used when associated variables are normally distributed
    3. Symbol is 'r'
  - *Spearman's Rank Correlation coefficient*
    1. Is used in grouped series
    2. Is used when associated variables are not normally distributed
    3. Symbol is 'rho (r)'.

Also Remember

- *Multiple correlation coefficient:* Is used for calculation of correlation between one variable (dependent) and the combination of two or more variables (independents)
- *Coefficient of determination:*
  - Is the percentage of variation in a variable that is explained by one or more of the others
  - Is generally obtained in a regression setup
  - Coefficient of determination = (Correlation coefficient)^2 = r^2
- *Coefficient of variation:*
  - Is a measure used to compare relative variability
  - Is a unit-free measure to compare dispersion of one variable with another

CV = SD/ Mean × 100 = $\sigma/\mu \times 100$.

185. Ans. (d) The lecturer has reported the correlation coefficient incorrectly *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p127 and Methods in Biostatistics by Mahajan, 7/e p170-178; Park 23/e p852]*

CORRELATION COEFFICIENT (R):

- Measures the degree or strength of relationship in a correlation (relationship between 2 quantitative or continuous variables)
- Correlation coefficient (r) lies between: –1 to +1 (–1 < r < +1)
- Strength of correlation:
  - Weak positive correlation: 0 < r < 0.3
  - Moderate positive correlation: 0.4 < r < 0.6

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- Strong positive correlation: r > 0.7
- Correlation is represented by: 'Scatter diagram'

In the given question, a lecturer states that the correlation coefficient between prefrontal blood flow under cognitive load and the severity of psychotic symptoms in schizophrenic patients is – 1.24
Since correlation coefficient (r) lies between –1 to +1 only, a value of r = – 1.24 IS NOT POSSIBLE. There is some computational mistake in calculation.

Also Remember

- *Few important ranges in public health:*

Parameter	Range (Lies between)
Correlation coefficient (r)	–1 to +1 (–1 < r < +1)
Coefficient of determination (r2)	0 to +1 (0 < r2 < +1)
Physical quality of life index (PQLI)	0 to +100 (0 < PQLI < +100)
Human development index (HDI)	0 to +1 (0 < HDI < +1)
Probability	0 to +1 (0% < Probability < 100%)
Sensitivity (screening test)	0% < Sensitivity < 100%
Specificity (screening test)	0% < Specificity < 100%
PPV (screening test)	0% < PPV < 100%
NPV (screening test)	0% < NPV < 100%

186. Ans. (a) Since there is a high correlation, the magnitudes of both the measurements are likely to be close to each other *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p127-30 and Methods in Biostatistics by Mahajan, 7/e p170-178; Park 23/e p853]*

- *Correlation coefficients:*
  - Pearson's Correlation coefficient:
  - Spearman's Rank Correlation coefficient
- *Coefficient of determination:*
  - Is the percentage of variation in a variable that is explained by one or more of the others
  - Is generally obtained in a regression setup
  - Coefficient of determination = (Correlation coefficient)^2 = r^2

In the given question, a cardiologist found a highly significant correlation coefficient (r = 0.90, p= 0.01) between the systolic blood pressure values and serum cholesterol values of the patients attending his clinic,
Since r = + 0.90 (p = 0.01; implies significant relationship), it means there is a strong positive correlation between systolic blood pressure (SBP) and serum cholesterol (SC); therefore as SBP increases, SC will also increase and vice-versa.
Thus, a patient with a high level of systolic BP is also likely to have a high level of serum cholesterol AND a patient with a low level of systolic BP is also likely to have a low level of serum cholesterol.
Since r = + 0.9; Coefficient of determination = $r^2 = (0.9)^2 = 0.81$
Interpretation of r^2: 0.81 or 81% of variation in systolic blood pressure among patients can be explained by their serum cholesterol values and vice-versa.

187. Ans. (c) Correlation can measure risk *[Ref. Methods in Biostatistics by Mahajan, 7/e p170-178; Park 23/e p853]*

188. Ans. (b) Scatter diagram *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p103 and Methods in Biostatistics by Mahajan, 7/e p25-27; Park 23/e p846]*

- *Scatter/Dot diagram:*
  - Also known as 'Correlation diagram'
  - Is used to depict 'correlation (relationship) between 2 quantitative variables'
  - Vertical axis in scatter diagram: should be the dependent or the outcome variable
  - In a scatter diagram, 2 imaginary lines are drawn along the distribution of dots/scatter
  - Correlation coefficient (r): Lies between –1 to +1

189. Ans. (b) Coefficient of regression *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p125 and Methods in Biostatistics by Mahajan, 7/e p178-82; Park 23/e p852-853]*

REGRESSION:

- Is change in measurements of a variable
- Provides structure of relationship between 2 quantitative variables

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- Regression Coefficient (b): Measure of change of one dependent variable (y) with change in independent variable (x) or variables (x_1, x_2, x_3……)

Equations of regression,
$y = a + b\ (x)$
$y = a + b\ (x_1) + c\ (x_2) + d\ (x_3)$,
where y is a dependent variable and x, x_1, x_2, x_3 are independent variables; a is a constant and b, c, d are regression coefficients

- *Types of regressions:*
  - *Simple linear regression:* Only one dependent variable and one independent variable
  - *Multiple linear regression:* Only one dependent variable and more than one independent variable
  - *Simple curvilinear regression:* Only one dependent variable and one independent variable, with some power of independent variable
  - *Multiple curvilinear regression:* Only one dependent variable and more than one independent variables, with some power of independent variables).
- *Types of regression equations:*

Types of regression	Equation
Simple linear regression	$y = a + b\ (x)$
Multiple linear regression	$y = a + b\ (x_1) + c\ (x_2) + d\ (x_3)$
Simple curvilinear regression	$y = a + b\ (x)^6$
Multiple curvilinear regression	$y = a + b\ (x_1)^2 + c\ (x_2)^4 + d\ (x_3)^3$

- Other types of regressions:

Types of regressions	Features	
	Dependent variables	**Independent variables**
Logistic regression	Qualitative, dichotomous	Qualitative/Quantitative/Mixed
ANOVA	Quantitative	Qualitative
ANCOVA	Quantitative	Qualitative + Quantitative
Multivariate multiple regression	Set of Quantitative	Set of Quantitative
MANOVA	Set of Quantitative	Set of Qualitative
Multivariate logistic regression	Set of Qualitative	Qualitative/ Quantitative

Also Remember

- *Relationships of variables:*
  - Association: Simultaneous existence of 2 variables
  - Correlation: Relationship between 2 quantitative or continuous variables
    1. Correlation coefficient (r): Lies between –1 to +1 (measures relationship between 2 variables)
  - Regression: Provides structure (quantification) of relationship between 2 quantitative variables
- *SE of mean:*
  - 'SE is a measure of chance variation,' and it does not mean error or mistake
  - SE is SD or variability of sample means

$$SE = \frac{SD}{\sqrt{\text{sample size}}} = \frac{\sigma}{n}$$

  - *Uses of standard error:*
    1. To work out limits of desired confidence within which population mean would lie
    2. To determine if sample is drawn from a known population or not
    3. To find SE of difference between 2 means (to know if difference is real and statistically significant)
    4. To calculate sample size (within desired confidence limits).

190. Ans. (a) Straight line *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p125-27 and Methods in Biostatistics by Mahajan, 7/e p172-182; Park 21/e p791, Park 22/e p795]*

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In the given question, the correlation of height with age is given by the equation y = a + biopsy, thus it is a Simple linear regression (equation: y = a + bx
Nature of the graph will be a straight line.

191. Ans. (d) r = - 0.8 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p127-29 and Methods in Biostatistics by Mahajan, 7/e p171-174; Park 21/e p791, Park 22/e p795]*

In the given question, correlation between IMR and economic status has to be inversely proportional (as economic status increases, IMR reduces and vice-versa)
But perfectly negative linear relation (r = –1) will not be seen (as IMR will also depend on other factors like available health services, literacy level, etc.)
Thus, it will show a moderately negative correlation (–1 < r < 0).

192. Ans. (d) Mistake in calculation *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p127 and Methods in Biostatistics by Mahajan, 7/e p171; Park 21/e p791, Park 22/e p795]*

193. Ans. (b) Strong statistically significant (+) association between work satisfaction and life expectancy *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p127-30 and Methods in Biostatistics by Mahajan, 6/e p186-90, 7/e p170-178; Park 21/e p791, Park 22/e p795]*

- *Correlation coefficients:*
  - Pearson's Correlation coefficient:
  - Spearman's Rank Correlation coefficient
- *Coefficient of determination:*
  - Is the percentage of variation in a variable that is explained by one or more of the others
  - Coefficient of determination = (Correlation coefficient)^2 = r^2

In the given question, a study finds a correlation coefficient of + 0.7 between self reported work satisfaction & expectancy of life in a random sample of 5000 corporate workers. (p = 0.01)
Since r = + 0.70 (p = 0.01; implies significant relationship), it means there is a strong positive correlation between self reported work satisfaction (SRWS) & expectancy of life (LE); therefore as SRWS increases, LE will also increase.
Thus, a patient with a high level of SRWS will have a high LE.
Since r = + 0.7; Coefficient of determination = $r^2 = (0.7)^2 = 0.49$
Interpretation of r^2: 0.49 or 49% of variation in expectancy of life can be explained by their self reported work satisfaction
Thus INCREASE in work satisfaction will improve life expectancy.

194. Ans. (c) Multiple linear regression *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p125-27 and Methods in Biostatistics by Mahajan, 7/e p178-182; Park 21/e p791, Park 22/e p795]*

In the given question,
Total Cholesterol level = a + b (calorie intake) + c (physical activity) + d (body mass index) is an example of Multiple linear regression equation $y = a + b(x_1) + c(x_2) + d(x_3)$.

Also Remember

- *Relationships of variables:*
  - *Association:* Simultaneous existence of 2 variables
  - *Correlation:* Relationship between 2 quantitative or continuous variables
  - *Regression:* Provides structure (quantification) of relationship between 2 quantitative variables

195. Ans. (a) Strong direct relationship between two variables *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p127-30 and Methods in Biostatistics by Mahajan, 7/e p170-74; Park 23/e p852-853]*

196. Ans. (c) Correlation coefficient *[Ref. K Park 23/e p852-853]*

197. Ans. (b) Negative correlation *[Ref. K Park 23/e p852-853]*

198. Ans. (b) 1 *[Ref. K Park 23/e p852-853]*

199. (a) Same *[Ref. Statistics by Lewicki, 1/e p24]*

- Generally different correlation coefficients (r) cannot be averaged directly: As Value of 'r' is not a linear function of magnitude of relation between 2 variables
- Average can be taken directly for Coefficient of determination (r^2)

In the given question (and graph), all correlation coefficients are same (+0.6), so their Coefficients of determinations would also be same (+ 0.6^2 = + 0.36 for each distribution)

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Hence, they can be averaged to come out to be exactly "+ 0.6"

Combined correlation coefficient = √ (0.36 + 0.36 + 0.36 + 0.36)/4 = + 0.6

Review Questions

200. Ans. (d) it is a wrong statement *[Ref: High yield biostastistics 2/e p50-52; Park 23/e p852-853]*

201. Ans. (c) -1 to +1 *[Ref. Park 23/e p852-853]*

ERRORS AND P-VALUE

202. Ans. (a) Alpha error *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-57 and Methods in Biostatistics by Mahajan, 7/e p111-113]*

- *Hypothesis (H):* Is an assumption about the status of a phenomenon
- *Null Hypothesis (H0):* In Biostatistics, when we have to prove a particular hypothesis about difference between 2 regimens, we make Null Hypothesis (For examples, If we have to prove that new treatment is better than older treatment, H_0 = new treatment is not better than older treatment)
- *Statistical errors:*

	H_0 rejected	H_0 not rejected
Null Hypothesis (H_0) true	Type I error	No error
Null Hypothesis (H_0) false	No error	Type II error

- *Type I Error:*
  - Null hypothesis is true but rejected
  - Probability of Type I error is given by 'P – value' (probability of declaring a significant difference when actually it is not present)
  - Significance (α) level: is the maximum tolerable probability of Type I error
  - Alpha is fixed in advance: P – value calculated can be less than, equal to or greater than alpha (α)
  - Keep Type I error to be minimum (P < α): Then results are declared statistically significant
- *Type II Error:*
  - Null hypothesis is false but not rejected (or accepted)
  - Probability of Type II error is given by beta (β) (probability of declaring no significant difference when actually it is present)

Also Remember

- Type I error is more serious than Type II error
- Power of a test: 1 – β

203. Ans. (d) The probability of a false positive conclusion that operation 'Operation A is better that Operation B', when in truth it is not, is 4% *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-56 and Methods in Biostatistics by Mahajan, 7/e p111-113]*

In the given question, the "P" value of a randomized controlled trial comparing operation A (new procedure) & Operation B (Gold standard) is 0.04;

Thus the probability of committing Type I error is 0.04 or 4% (i.e. probability of declaring a false positive conclusion that operation 'Operation A is better that Operation B', when in truth it is not, is 4%).

Also Remember

- *Type I error:*
  - Significance (α) level: is the maximum tolerable probability of Type I error
  - Alpha is fixed in advance: P – value calculated can be less than, equal to or greater than alpha (α)
  - Keep Type I error to be minimum (P < α): Then results are declared statistically significant.

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Also Remember

- Type I error is more serious than Type II error
- *Power of a test:* 1 – β
  - Is probability of rejecting a Null hypothesis when a predetermined clinically significant difference is indeed present
  - Power can be increased by increasing the no. of subjects in a trial

- A test with a high specificity has a low Type I error rate
  - False positive rate (α) = 1 – specificity
  - False negative rate (β) = 1 – sensitivity

204. Ans. (b) Decreasing b error *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p156-60]*

- *Power of a Test:*
  - Is probability of rejecting a Null hypothesis when a predetermined clinically significant difference is indeed present
  - Measures the ability to demonstrate an association, when one really exists
  - Power of a statistical test: 1 – β (1 – probability of Type II error)
  - Power of a statistical test is complimentary to β (probability of Type II error)
  - Power of a statistical test is a numeric representation of: Sensitivity
  - Power of a statistical test can be increased by:
    1. Increasing the no. of subjects in a trial (sample size)
    2. Reducing b (probability of Type II error)
    3. Increasing sensitivity
  - Power of a statistical test is also used for calculation of sample size for a study
- *Statistical errors:*

	H0 rejected	H0 not rejected
Null Hypothesis (H0) true	Type I error	No error
Null Hypothesis (H0) false	No error	Type II error

- *Types of Statistical errors:*

Type I Error	Type II Error
Null hypothesis is true but rejected	Null hypothesis is false but not rejected
Probability of Type I error is given by 'P – value' (probability of declaring a significant difference when actually it is not present)	Probability of Type II error is given by beta (β) (probability of declaring no significant difference when actually it is present)
Significance (α) level: is the maximum tolerable probability of Type I error	
Keep Type I error to be minimum (P < α): Results are declared statistically significant Type I error is more serious	Power of a test: (1 – β) Is probability of rejecting a Null hypothesis when a predetermined clinically significant difference is indeed present

Also Remember

- A test with a high specificity has a low Type I error rate
  - False positive rate (α) = 1 – specificity
  - False negative rate (β) = 1 – sensitivity

205. Ans. (d) Nothing can be concluded as the information given is inadequate *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p141 and Methods in Biostatistics by Mahajan, 7/e p111]*

In the given question, In assessing the association between maternal nutritional status and the birth weight of the new-borns, two investigators A and B studied separately and found significant results with p values 0.02 and 0.04 respectively Only levels of significance are given, thus we can only conclude that investigator A has 98% chance of being correct whereas investigator B has 96% chance of being correct.

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206. Ans. (a) Type-I error (a error) *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-56 and Methods in Biostatistics by Mahajan, 7/e p111-113]*

In the given question, a randomized trial comparing efficacy of two regimens showed that difference is statistically significant with $p < 0.001$ (null hypothesis is rejected) but in reality the two drugs do not differ in their efficacy (null hypothesis is true),
Thus it is Type-I error (α error).

207. Ans. (b) The probability of declaring a significant difference is 1% *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-56]*

208. Ans. (b) Is equal to 1-β *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155]*

- 'Type I error is usually fixed in advance' by the choice of level of significance employed in the test
- Type I error is more serious than Type II error
- Power of a test: 1 – β
  - Is probability of rejecting a Null hypothesis when a predetermined clinically significant difference is indeed present
  - Power can be increased by increasing the no. of subjects in a trial
- There is no mathematical relationship between α and β.

209. Ans. (c) When Null Hypothesis is true but is rejected, it is Type-II error *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-57 and Methods in Biostatistics by Mahajan, 7/e p111-113]*

210. Ans. (b) 1 – β *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p157]*

- *Statistical Power of a test:*
  - Is probability of rejecting a Null hypothesis when a predetermined clinically significant difference is indeed present
  - Power can be increased by increasing the no. of subjects in a trial
  - Is the 'probability that a study/trial will be able to detect a specified difference'
  - Measures the ability to demonstrate an association when one really exists
    Power of a statistical test = 1 – Probability of Type II error = 1 – β
  - Power can be increased by: Including a higher no. of subjects under trial
  - There is no mathematical relationship between α and β.

Also Remember

- *Most power-efficient parametric test:* F – test
- *Most power-efficient non-parametric test:* Kruskal Wallis test.

211. Ans. (b) Rejecting a null hypothesis when true *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p156]*

- *P-value:*
  - Is the 'Probability of Type I error' (Null hypothesis is true but rejected)
  - Significance (α) level: is the maximum tolerable probability of Type I error
  - P- value is calculated (on basis of data while Alpha is fixed in advance: by the choice of level of significance employed in the test
  - P – value calculated can be less than, equal to or greater than alpha (α)
  - Keep Type I error to be minimum ($P < \alpha$): Then results are declared statistically significant.

212. Ans. (a) Chi-square test *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p170-73 and Methods in Biostatistics by Mahajan, 7/e p154-169]*

In the given question, association is to be studied between maternal intake of iron (yes/no) and birth weights of newborns (to see the proportion of low birth weight) i.e. between 2 qualitative characteristics, thus Chi-square test is most suitable

213. Ans. (a) Type I error (alpha error) *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-57 and Methods in Biostatistics by Mahajan, 7/e p111-113]*

- A test with a high specificity has a low Type I error rate
  - False positive rate (α) = 1 – specificity
  - False negative rate (β) = 1 – sensitivity

214. Ans. (b) Risk is more associated with Group B *[Ref. Internet]*

In the given question. Both Group A Conficence interval (1.0 – 3.1) as well as Group C Conficence interval (0.9 – 1.7) contains 1 in their range. So, there is a possibility of true value of strength of association being 1 (implying no association)

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Whereas Group B (Cl = 1.1 – 1.7) has no such possibility, so this value of Odds ratio (1.4) may be least in all three groups but shows more association.

215. Ans. (a) As the sample size increases, Standard error will also increase *[Ref. Simple Biostatistics by Indrayan & indrayan, 1/e p139-40 and Methods in Biostatistics by Mahajan, 7/e p105]*

216. Ans. (a) Probability of declaring a significant difference when actually it is not present *[Ref. Methods in Biostatistics by Mahajan, 7/e p111-113]*

217. Ans. (a) Type 1 error *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-57]*

218. Ans. (c) It is unlikely by chance and when P < 0.05 *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-57]*

219. Ans. (a) Null hypothesis is true but rejected *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p155-57 and Methods in Biostatistics by Mahajan, 7/e p111-113]*

STATISTICAL ERRORS

	H0 rejected	H0 not rejected
Null Hypothesis (H0) true	Type I error	No error
Null Hypothesis (H0) false	No error	Type II error

Review Questions

220. Ans. (a) Probability of Type I Error is < 0.05 *[Ref. K.S. Negi Biostatistics, 7/e p105]*

221. Ans. (b) Null hypothesis rejected and the study is accepted *[Ref. Park 23/e p852]*

MISCELLANEOUS

222. Ans. (c) Bland and Altman analysis *[Ref. Internet]*

BLAND-ALTMAN ANALYSIS:

- Is not a statistical test measured with a p-value
- Is a process used to assess agreement between two methods of measurement
- Is used to 'assess level of agreement between 2 methods' to compare a new technique with an established one.

Also Remember

- *Kolmogorov-Smirnov test:*
  - Is one of the most useful and general nonparametric methods for comparing two samples
  - KS-test tries to determine if two datasets differ significantly

223. Ans. (a) Criterion validity *[Ref. Grieve's Modern Manual Therapy by Jeffery Boyling; p409]*

- *Validity:* Refers to what extent the test measures which it purports to measure (adequacy of measurement)
- *Validity has 2 components:*
  - Sensitivity
  - Specificity
- *Types of Validity:*
  - *Conclusion validity:* Defines if there is a relationship between 2 variables
  - *Internal validity:* Assuming relationship between 2 variables, defines if it is causal
    1. Is free of bias
    2. Valid conclusions can be drawn for individuals in a sample
  - *Construct validity:* Assuming causal relationship between 2 variables, defines if our theory is best to our constructs
  - *External validity:* Assuming causal relationship between 2 variables, defines if our theory can be generalized to the broader population
  - *Concurrent validity:* Refers to the degree of correlation with other measures of the same construct measured at the same time
  - *Face (Logical) validity:* Relevance of a measurement appear obvious
  - *Content validity:* Measurement of all variable components
  - *Consensual validity:* If no. of experts agree to a parameter

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- *Criterion validity:* If compared with a reference or gold standard.
  1. Is best measure of validity
  2. Usually expressed as sensitivity & specificity
- *Discriminant validity:* If not showing strong correlation between 2 variables.

224. Ans. (d) All are true *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p31, 222]*

DELPHI METHOD

- Delphi method: Is a 'systematic interactive forecasting method' for obtaining consensus forecasts from a panel of independent experts
  - Method: The carefully selected experts answer questionnaires in two or more rounds; After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments; Thus, participants are encouraged to revise their earlier answers in light of the replies of other members of the group
  - The range of the answers decrease and the group will converge towards the 'correct' consensual answer; Finally, the process is stopped after a pre-defined stop criterion (e.g. number of rounds, achievement of consensus, stability of results) and the mean or median scores of the final rounds determine the results
- The objective of most Delphi applications: The reliable and creative exploration of ideas or the production of suitable information for decision-making.
- The Delphi Method is based on: A structured process for collecting and distilling knowledge from a group of experts by means of a series of questionnaires interspersed with controlled opinion feedback
- The Delphi method is an exercise in group communication among a panel of geographically dispersed experts
- In general, the Delphi method is useful in answering one, specific, single-dimension question.

Also Remember

- *Mini-Delphi or Estimate-Talk-Estimate (ETE):* The delphi technique when adapted for use in face-to-face meetings.

225. Ans. (b) 69 and 75 kg *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p141 and Methods in Biostatistics by Mahajan, 7/e p92; Park 23/e p849]*

- *Confidence interval (CI):*
  - Is the interval within which a parameter value is expected to lie with certain confidence levels, as could be revealed by repeated samples
  - Is the 'range that is likely to contain the population mean when so obtained for repeated samples'
  - A narrow CI is always preferable: as it tells more precisely what might be the population mean BUT also it will have higher chances of not containing the population mean
    1. Larger the sample size, narrower is CI
    2. Smaller the SD (σ), narrower is CI

95% CI for population mean = Mean ± 2SD (μ ± 2σ)

In the given question, n = 100 adult Delhites, Mean weight (μ) = 72 kg, Standard deviation (σ) = 1.5

95% CI for of wt of Delhites = Mean ± 2SD (μ ± 2σ)

= 72 ± 2 (1.5) = 72 – 3, 72 + 3 = 69, 75 kg.

Also Remember

- *Confidence level:*
  - Is the level of hope or expectation fixed at a sufficiently high level while dealing with samples, to ensure high reliability
  - Is the 'degree of assurance for an interval to contain the value of the parameter'
  - There is NO WAY to achieve 100% confidence
  - Internationally acceptable confidence level: 95%
  - Maximum tolerance of probability of Type I error (σ) is the probability that CI would not contain the population mean
  - Confidence level = 1 – α
- *Confidence limits:* Are the upper and lower boundaries of a confidence interval.

226. Ans. (c) Recall bias *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p236; Park 21/e p69, Park 22/e p70)*

Refer to chapter 3, Theory.

In the given question, in a drug trial a 50 yr old patient with CAD is being interviewed about his dietary & smoking habits. Since history is being recalled regarding exposure, it can introduce recall bias.

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227. Ans. (d) Correlation *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p129-30 and Methods in Biostatistics by Mahajan, 6/e p186-90, 7/e p170]*

CORRELATION:

- Is relationship between 2 quantitative or continuous variables
  - Degree of relationship
  - Direction of relationship
- Correlation is represented by: 'Scatter diagram' (2 imaginary lines are drawn along the distribution of dots/ scatter)
- Correlation coefficient (r): Measures the degree or strength of relationship in a correlation (Correlation coefficient (r) lies between: –1 to +1 (–1 < r < +1)
- *Correlation coefficients:*

	Pearson's coefficient	Spearman's coefficient
Synonym	Product moment Correlation	Rank Correlation
Used for	Ungrouped series	Grouped series
Applicability	When associated variables are normally distributed	When associated variables are not normally distributed
Symbol	'r'	'rho (r)'
Domination	Is dominated by linearity	Non-linear and curvilinear relationships

Also Remember

- *Few other coefficients in statistics:*
  - Multiple correlation coefficient: Is used for calculation of correlation between one variable (dependent) and the combination of two or more variables (independents)
  - *Coefficient of determination (COD):*
    1. Is the percentage of variation in a variable that is explained by one or more of the others
    2. Is generally obtained in a regression setup
    3. COD = (Correlation coefficient)^2 = r^2
  - *Coefficient of variation (COV):*
    1. Is a measure used to compare relative variability
    2. Is a unit-free measure to compare dispersion of one variable with another
    3. COV = SD/ Mean × 100 = $\frac{\sigma}{\mu} \times 100$.

228. Ans. (a) Accuracy *[Ref. A Dictionary of Public Health by J Kishore, p5, 410]*

- *Accuracy:* degree of closeness of a measured or calculated quantity to its actual (true) value
- *Precision:* The degree to which further measurements or calculations show the same or similar results
  - Precision is also known as: Reliability, Repeatability, Consistency or Reproducibility.

Also Remember

- Accuracy = [(sensitivity) (prevalence)] + [(specificity) (1 – prevalence)]
- Accuracy = (TP + TN)/(TP + FP + FN + TN)
- Reliability is precision, while validity is accuracy
- PPV is also known as 'post-test probability of a disease' or 'precision rate'
- Tests of accuracy and precision:

Tests of accuracy	Tests of precision
Mean chart	Range chart
Levy Jennings (LJ) chart	R – chart
Shewhart control chart	

229. Ans. (a) Gives attributable risk *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p131-32 Park 22/e p76]*

- Useful Parameter(s) obtained by epidemiological studies:

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Epidemiological studies	Useful parameter(s) obtained
Cohort study	Incidence, Relative risk, Attributable risk, Population attributable risk
Cross sectional study	Prevalence
Ecological study	Group characteristics
Case control study	Odds ratio

Also Remember

- Attributable Risk = $\frac{(\text{Incidence exposed} - \text{Incidence nonexposed}}{\text{Incidence exposed}} \times 100$

  $AR = \frac{I_{exp} - I_{nonexp}}{I_{exp}} \times 100$
- AR calculation requires incidence which can be obtained from only a cohort study (Not from a case control study)
- AR is a good measure of extent of public health problem caused by the exposure
- AR is a useful tool for assessing priorities for health action
- AR is also known as 'Absolute risk' or 'excess risk' or 'risk difference'.

230. Ans. (a) Precise *[Ref. A Dictionary of Public Health by J Kishore, p5, 410; Park 21/e p126, Park 22/e p129]*

231. Ans. (d) Measures of central tendency *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p108-11 and Methods in Biostatistics by Mahajan, 7/e p33-35; Park 23/e p847]*

232. Ans. (c) 2.5% *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p141-42 and Methods in Biostatistics by Mahajan, 7/e p92; Park 23/e p849]*

- In Normal distribution,
  - Mean ± 1SD (μ ± 1σ) covers 68% values
  - Mean ± 2SD (μ ± 2σ) covers 95% values
  - Mean ± 3SD (μ ± 3σ) covers 99% values

In the given question, 95% Confidence Interval (CI) for prevalence of Cancer in Smokers aged >65 years is 56% to 76%
Thus, 56% to 76% range covers 95% CI, thus rest 5% probability is of being OUTSIDE THIS RANGE, i.e. prevalence will be either <56% or >76%
Even this will be symmetrically distributed (Normal curve is bilaterally symmetrical), thus, 2.5% probability will be of having prevalence <56%
And 2.5% probability will be of having prevalence >76%.

Also Remember

- *Confidence interval (CI):*
  - Is the interval within which a parameter value is expected to lie with certain confidence levels, as could be revealed by repeated samples
  - Is the 'range that is likely to contain the population mean when so obtained for repeated samples'
  - A narrow CI is always preferable: as it tells more precisely what might be the population mean BUT also it will have higher chances of not containing the population mean.
    1. Larger the sample size, narrower is CI
    2. Smaller the SD (s), narrower is CI

    95% CI for population mean = Mean ± 2SD (μ ± 2σ)
- *Confidence level:*
  - Is the level of hope or expectation fixed at a sufficiently high level while dealing with samples, to ensure high reliability
  - Is the 'degree of assurance for an interval to contain the value of the parameter'
  - There is NO WAY to achieve 100% confidence
  - Internationally acceptable confidence level: 95%
  - Maximum tolerance of probability of Type I error (α) is the probability that CI would not contain the population mean Confidence level = 1 – α

Contd...

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Contd...

- *Confidence limits:*
  - Are the upper and lower boundaries of a confidence interval
- *Central limit theorem:*
  - Means that 'sample means have a tremendous tendency to follow a Gaussian (Normal) form of distribution, especially for large samples'.
  - Is observed even when distribution of individual values is highly skewed.

233. Ans. (a) Precise but inaccurate *[Ref. A Dictionary of Public Health by J Kishore, p5, 410; Park 21/e p126, Park 22/e p129]*

- *Accuracy:* Degree of closeness of a measured or calculated quantity to its actual (true) value
- *Precision:* The degree to which further measurements or calculations show the same or similar results
  - Precision is also known as: Reliability, Repeatability, Consistency or Reproducibility

For example, if actual BP of a student at a given time is 120/80 mm Hg, and different BP apparatus are used then precision and accuracy can be determined by their readings:

	BP readings	Inference
BP Apparatus 1	140/96, 140/96, 140/96	Precise BUT Inaccurate
BP Apparatus 2	140/96, 120/62, 90/42	Imprecise AS WELL AS Inaccurate
BP Apparatus 3	120/80, 120/80, 120/80	Precise AS WELL AS accurate
BP Apparatus 4	122/82, 120/80, 118/78	Imprecise BUT Accurate

Also Remember

- Accuracy = [(sensitivity) (prevalence)] + [(specificity) (1 – prevalence)]
- Accuracy = (TP + TN)/(TP + FP + FN + TN)
- Reliability is precision, while validity is accuracy
- Reliability is inversely related to random error
- PPV is also known as 'post-test probability of a disease' or 'precision rate'.

234. Ans. (c) Sensitivity & (1 – Specificity) *[Ref. A Dictionary of Public Health by J Kishore, p446-47]*

RECEIVER OPERATOR CHARACTERISTIC (ROC) CURVE:

- Is a graphical representation between sensitivity and specificity of a diagnostic test
- ROC curve is 'drawn between Sensitivity and (1 – Specificity)'
  - ROC curve is drawn between True positives and False positive error rate
- In clinical tests, ROC curve is 'used to determine a cut-off point'
- ROC curve is 'equivalent to Likelihood ratio for a positive result (LR+)'
- Types of ROC curves:
  - Straight line at 45° (Line (a): No benefit by this test/cut-off
  - Straight lines above line a (Lines b and c): Fair, Good results by this test/ cut-off
  - Uppermost line touching Y-axis and then horizontal line (Line d): Excellent results by this test/ cut-off (Perfect ROC: 100% sensitivity & 100% specificity).

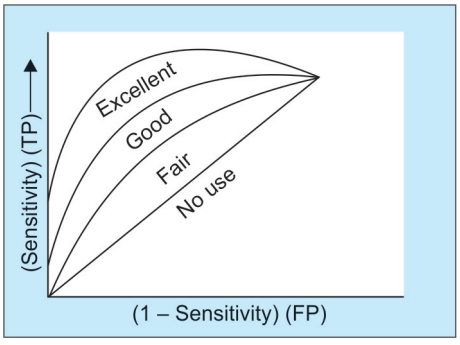

Figure: Receiver operating characteristic (ROC) curve

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235. Ans. (c) 1.0 *[Ref. A Dictionary of Public Health by J Kishore, p304]*

- *Likelihood ratio:* Incorporates both the sensitivity and specificity of the test and provides a direct estimate of how much a test result will change the odds of having a disease
  - Likelihood ratio for a positive result (LR+) tells you how much the odds of the disease increase when a test is positive

$$LR+ = \frac{\text{Sensitivity}}{1 - \text{Specificity}}$$

  - Likelihood ratio for a negative result (LR-) tells you how much the odds of the disease decrease when a test is negative

$$LR- = \frac{1 - \text{Sensitivity}}{\text{Specificity}}$$

  - Post-test odds (the chances that patient has a disease): Once you have specified the pre-test odds (the likelihood that the patient would have a specific disease prior to testing), you multiply them by the likelihood ratio

Oddspost = Oddspre × Likelihood ratio

In the given question,

Sensitivity of a screening test = 90 % while its specificity = 10%.

Likelihood ratio for a positive test will be,

LR+ = Sensitivity/(1 – Specificity) = 0.90/ (1 – 0.10) = 1.

236. Ans. (b) Specificity increases but sensitivity decreases *[Ref. Simple Biostatistics by Indrayan & Indrayan, 1/e p56; Park 23/e p139]*

SCREENING TESTS USED IN SERIES:

A population is subjected to one screening test followed by a second screening test; 2nd screening test is applied on those individuals only who test positive on the 1st screening test

- Combined sensitivity of 2 tests A & B in series: Sensitivity (A) × Sensitivity (B)
- Combined specificity of 2 tests A & B in series: [(Specificity A) + (Specificity B)] – [(Specificity A) × (Specificity B)]

SCREENING TESTS USED IN PARALLEL:

A population is subjected to two (or more) screening tests at the same time; each of the individuals is subjected to both (or all) screening tests

- Combined sensitivity of 2 tests A & B in parallel: [(Specificity A) + (Specificity B)] – [(Specificity A) × (Specificity B)]
- Combined specificity of 2 tests A & B in parallel: Specificity (A) × Specificity (B)

	Tests in series	Tests in parallel
Combined sensitivity	Decreases	Increases
Combined specificity	Increases	Decreases
Combined PPV	Increases	Decreases
Combined NPV	Decreases	Increases

237. Ans. (d) Measure of central tendency *[Ref. Park 23/e p847]*

238. Ans. (b) Cronbach's alpha *[Ref. Wikipedia]*

- *Association:* Is any relationship between two measured quantities that render them statistically dependent
- Correlation coefficient
- Odds ratio
- Good man's and Kruskal's Lambda
- P value
- Cronbach's alpha: is a measurement of internal consistency or reliability
- Is particularly useful for Likert Scales (grading of continuum).

239. Ans. (b) Correlation analysis/Bland and Altmann test *[Ref. Statistical analysis quick reference guide, 1/e p78]*

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240. Ans. (b) Previously significant data becomes insignificant *[Ref. Defence Counsel Journal, Vol. 66, p55]*

If Confidence limit is increased:

- Then degree of assurance of intervals containing the population mean is increased, BUT getting the value of population mean become less precise
- Previously significant data will now become less significant

241. Ans. (c) 81-89 *[Ref. Research Methods by Pittenger, 1/e p214]*

CONFIDENCE INTERVALS

- A confidence interval gives an estimated range of values which is likely to include an unknown population parameter, the estimated range being calculated from a given set of sample data
- Confidence Intervals (CI) = Mean ± Z (Standard error),

where 'Z' is the Critical value for the given CI, and

SE = SD/ √n (SD Standard deviation, n = Sample size)

- Critical value for 90% Confidence level (Z68) = 1.0
- Critical value for 90% Confidence level (Z90) = 1.645
- Critical value for 95% Confidence level (Z95) = 1.96
- Critical value for 98% Confidence level (Z98) = 2.33
- Critical value for 99% Confidence level (Z99) = 2.575

In the given question, Mean (μ) = 85 ml/ min, Standard deviation (σ) = 25, and Z90 = 1.645 (as we are asked 90% CI)

So, Confidence intervals (CI_{90}) = Mean ± Z_{90} (SE)

CI_{90} = 85 ± 1.645 (25/√100) = 81 – 89

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SECTION 3 Image-based Questions

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Image-based Questions

PLATE 1

Q1. Identify the symbol as given in PLATE-1?
(a) MDT
(b) DOTS
(c) ART
(d) ASHA

PLATE 2

Q2. Identify the symbol as given in PLATE-2?
(a) Tuberculosis
(b) Malaria
(c) Leprosy
(d) HIV/AIDS

PLATE 3

Q3. Identify the program symbol as given in PLATE-3?
(a) RNTCP
(b) NLEP
(c) NVBDCP
(d) NACP

PLATE 4

Q4. Identify the program symbol as given in PLATE-4?
(a) RNTCP
(b) NLEP
(c) NRHM
(d) NACP

Ans 1. (b) DOTS

Ans 2. (d) HIV/AIDS

Ans 3. (b) NLEP

Ans 4. (c) NRHM

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PLATE 5

Q5. Identify the program depicted by symbol as given in PLATE-5?

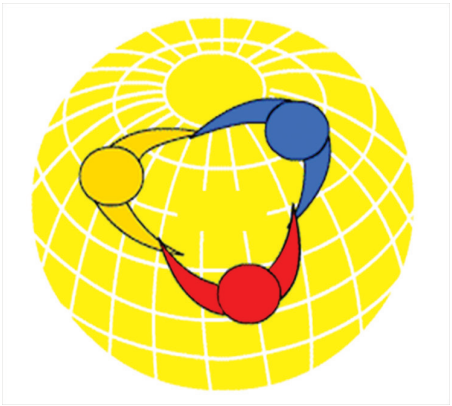
(a) NRHM
(b) NVBDCP
(c) RCH
(d) NPCDCS

PLATE 6

Q6. Identify the program depicted by symbol as given in PLATE-6?

(a) NRHM
(b) NPCB
(c) NPCDCS
(d) RCH

PLATE 7



Q7. Identify the program symbol as given in PLATE-7?

(a) NUHM
(b) PMJDY
(c) NPCDCS
(d) IDSP

PLATE 8

Q8. Identify component of NACP as shown in PLATE-8?

(a) ART
(b) ICTC
(c) PPTCT
(d) Blood transfusion

Ans 5. (b) NVBDCP

Ans 6. (b) NPCB

Ans 7. (d) IDSP

Ans 8. (c) PPTCT

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PLATE 9

Q9. Identify services provided at clinic shown in symbol in PLATE-9?
(a) ARI
(b) Diarrhoea
(c) RTI/STI
(d) Blood transfusion

PLATE 10

Q10. Chairman of agency shown in PLATE-10?
(a) Minister of Labour
(b) Defence Minister
(c) Prime Minister
(d) Minister of Health-FW

PLATE 11

Q11. Act pertaining to symbol shown in PLATE-11 was enacted in?
(a) 1995
(b) 2005
(c) 2006
(d) 2014

PLATE 12

Q12. PLATE-12 is symbol of
(a) Vaccine safety labels
(b) Contraceptive efficacy labels
(c) Drugs toxicity labels
(d) Pesticide toxicity labels

Ans 9. (c) RTI/STI

Ans 10. (c) Prime Minister

Ans 11. (c) 2006

Ans 12. (d) Pesticide toxicity labels

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PLATE 13

Q13. Identify the symbol as given in PLATE-13?
(a) Organ Transplantation Act 1994
(b) RTI Act 2005
(c) MTP Act 1971
(d) NREGA Act 2005

PLATE 14

Q14. Identify the organization depicted by symbol as given in PLATE-14?
(a) WHO
(b) UNICEF
(c) UNDP
(d) UNAIDS

PLATE 15

Q15. Identify the organization depicted by symbol as given in PLATE-15?
(a) WHO
(b) UNICEF
(c) UNDP
(d) UNAIDS

PLATE 16

Q16. Headquarters location of international health agency depicted in PLATE-16?
(a) New Delhi
(b) Geneva
(c) New York
(d) Rome

Ans 13. (d) NREGA Act 2005

Ans 14. (a) WHO

Ans 15. (b) UNICEF

Ans 16. (d) Rome

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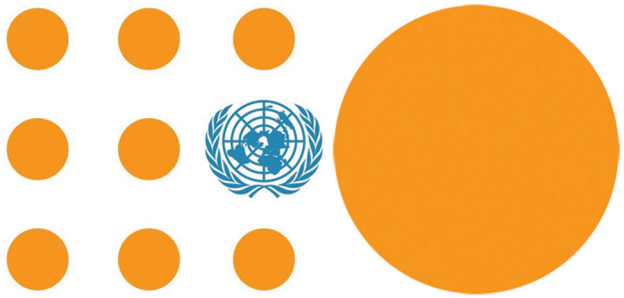
PLATE 17

Q17. Identify the organization depicted by symbol as given in PLATE-17?

(a) DFID
(b) World Bank
(c) UNDP
(d) UNAIDS

PLATE 18



Q18. Identify the organization depicted by symbol as given in PLATE-18?

(a) UNAIDS
(b) World Bank
(c) UNDP
(d) UNFPA

PLATE 19

Q19. Identify the scientist as given in PLATE-19?

(a) Louis Pasteur
(b) Edward Jenner
(c) James Lind
(d) Hippocrates

PLATE 20

Q20. Identify the scientist as given in PLATE-20?

(a) Louis Pasteur
(b) Edward Jenner
(c) James Lind
(d) Hippocrates

Ans 17. (b) World Bank

Ans 18. (d) UNFPA

Ans 19. (a) Louis Pasteur

Ans 20. (b) Edward Jenner

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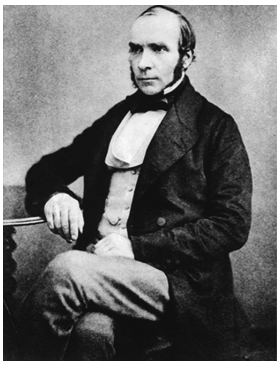
PLATE 21

Q21. Identify the scientist as given in PLATE-21?
(a) John Snow
(b) Edward Jenner
(c) James Watson
(d) Robert Koch

PLATE 22

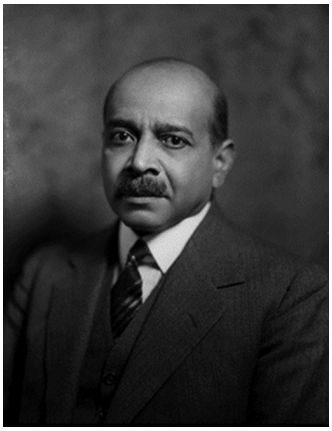


Q22. Identify the scientist as given in PLATE-22?
(a) John Snow
(b) Alexander Fleming
(c) James Lind
(d) Hippocrates

PLATE 23

Q23. Identify the scientist as given in PLATE-23?
(a) John Snow
(b) Alexander Fleming
(c) James Lind
(d) Hippocrates

PLATE 24



Q24. Identify person as given in PLATE-24?
(a) Hargobind Khorana
(b) Alexander Fleming
(c) Joseph Bhore
(d) Hippocrates

Ans 21. (d) Robert Koch

Ans 22. (a) John Snow

Ans 23. (c) James Lind

Ans 24. (c) Joseph Bhore

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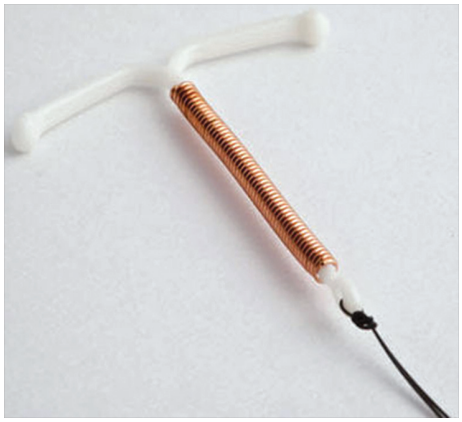
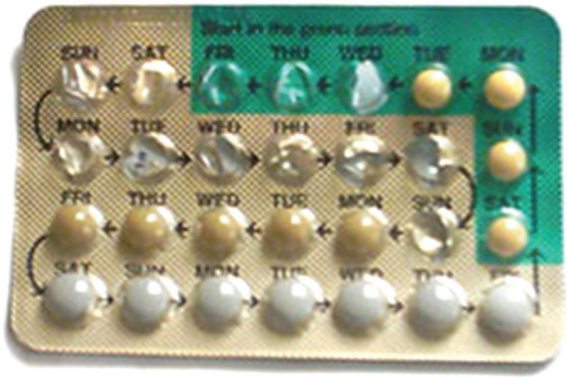
PLATE 25



Q25. Identify PLATE-25?

(a) Diaphragm
(b) Vaginal ring
(c) Vaginal sponge
(d) IUD

PLATE 26



Q26. Identify PLATE-26?

(a) Iron folic acid (IFA) tablets
(b) DOTS Category 1
(c) MDT PBL blister
(d) Combined OCPs

PLATE 27

Q27. Identify PLATE-27?

(a) CuT 380 A
(b) Progestasert
(c) Lippes loop
(d) Mirena

PLATE 28

Q28. Identify PLATE-28?

(a) DMPA
(b) Vaginal ring
(c) Diaphragm
(d) Vaginal sponge

Ans 25. (d) IUD

Ans 26. (d) Combined OCPs

Ans 27. (c) Lippes loop

Ans 28. (d) Vaginal sponge

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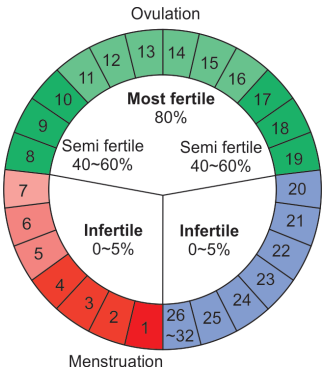
PLATE 29

Q29. Identify PLATE-29?

(a) Male condom
(b) Female condom
(c) Diaphragm
(d) Vaginal sponge

PLATE 30



Q30. Identify PLATE-30?

(a) Rhythm method
(b) Cervical mucus method
(c) BBT method
(d) Coitus interruptus

PLATE 31

Q31. Identify vector given in PLATE-31?

(a) Sandfly
(b) Anopheles mosquito
(c) Aedes mosquito
(d) Culex mosquito

PLATE 32

Q32. Identify vector given in PLATE-32?

(a) Sandfly
(b) Anopheles mosquito
(c) Aedes mosquito
(d) Culex mosquito

Ans 29. (b) Female condom

Ans 30. (a) Rhythm method

Ans 31. (b) Anopheles mosquito

Ans 32. (c) Aedes mosquito

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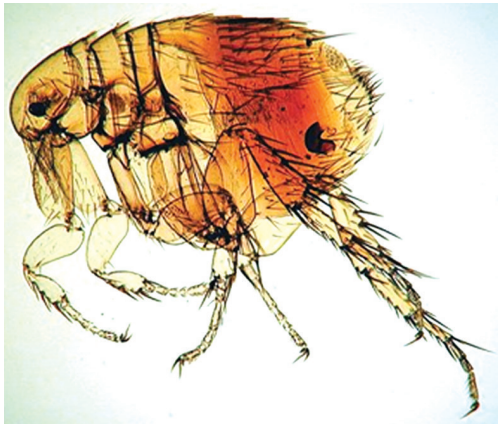
PLATE 33



Q33. Identify vector given in PLATE-33?

(a) Sandfly
(b) Housefly
(c) Hard tick
(d) Rat flea

PLATE 34

Q34. Identify vector given in PLATE-34?

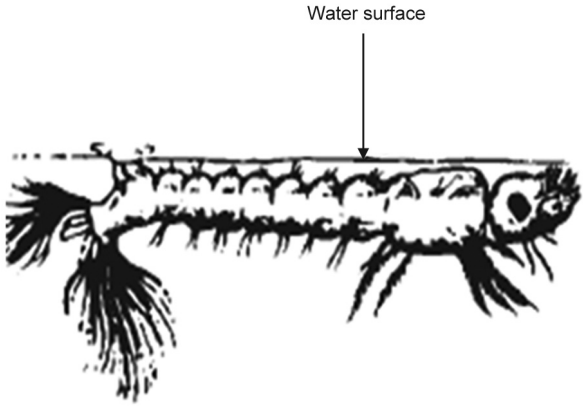
(a) Simulum
(b) Musca domestica
(c) Phlebotamus
(d) Reduviid bug

PLATE 35

Q35. Identify vector given in PLATE-35?

(a) Soft tick
(b) Hard tick
(c) Louse
(d) Rat flea

PLATE 36



Q36. Identify larva of mosquito given in PLATE-36?

(a) Anopheles
(b) Clulex
(c) Aedes
(d) Mansonia

Ans 33. (d) Rat flea

Ans 34. (b) Musca domestica

Ans 35. (c) Louse

Ans 36. (a) Anopheles

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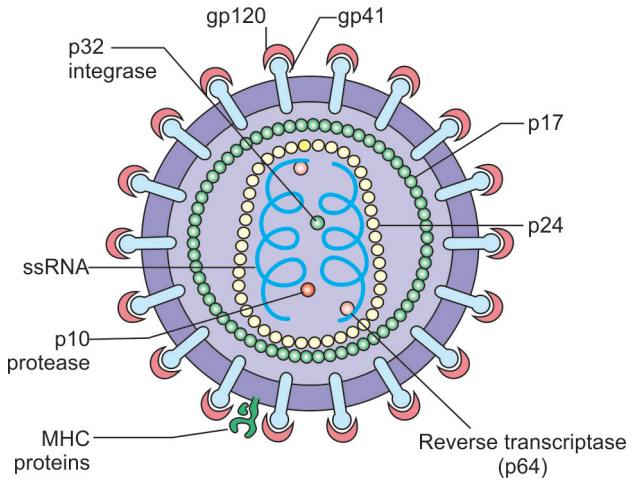
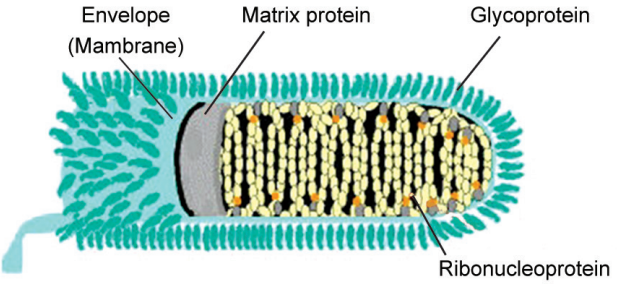
PLATE 37



Q37. Identify organism given in PLATE-37?

(a) Rabies virus
(b) Ebola virus
(c) H1N1 virus
(d) HIV virus

PLATE 38



Q38. Identify organism given in PLATE-38?

(a) Rabies virus
(b) Ebola virus
(c) H1N1 virus
(d) HIV virus

PLATE 39

Q39. Identify organism given in PLATE-39?

(a) H7N9 virus
(b) Ebola virus
(c) H1N1 virus
(d) H5N1 virus

PLATE 40

Q40. Identify injection technique in PLATE-40?

(a) Subcutaneous
(b) Intradermal
(c) Intramuscular
(d) Intravenous

Ans 37. (d) HIV virus

Ans 38. (a) Rabies virus

Ans 39. (b) Ebola virus

Ans 40. (b) Intradermal

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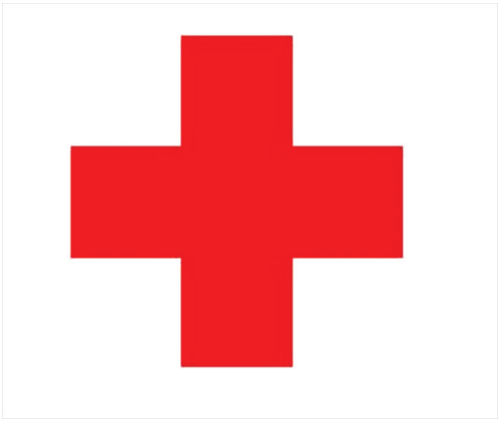
PLATE 41

Q41. Identify symbol given in PLATE-41?

(a) Disaster management
(b) Occupational health
(c) Biomedical waste management
(d) Family planning and contraception

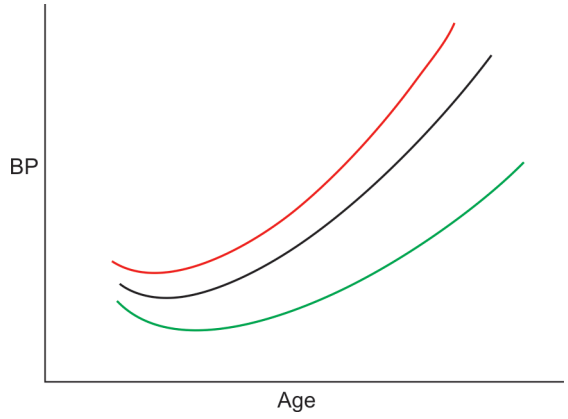
PLATE 42



Q42. Identify symbol given in PLATE-42?

(a) Medical professionals
(b) Nursing staff
(c) International Red Cross
(d) Colombo plan

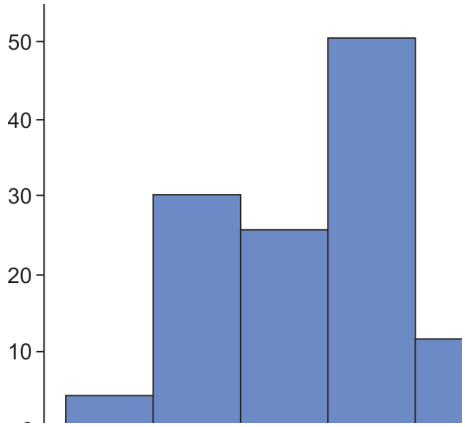
PLATE43



Q43. Identify PLATE-43?

(a) WHO Growth chart
(b) ICDS Growth chart
(c) Tracking phenomena
(d) Rule of halves

PLATE 44



Q44. Identify statistical diagram given in PLATE-44?

(a) Bar chart
(b) Histogram
(c) Frequency polygon
(d) OGIVE

Ans 41. (c) Biomedical waste management

Ans 42. (c) International Red Cross

Ans 43. (c) Tracking phenomena

Ans 44. (b) Histogram

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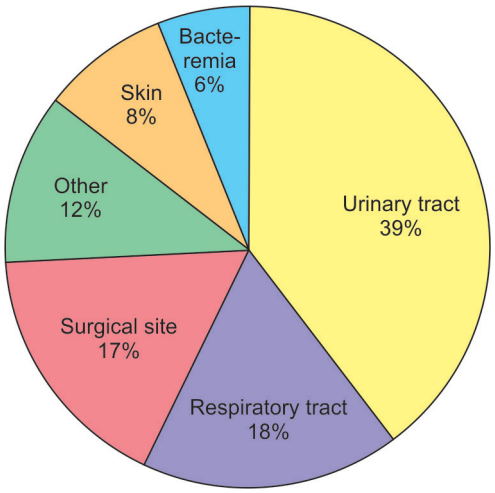
PLATE 45



Q45. Identify statistical diagram given in PLATE-45?

(a) Pictogram
(b) Scatter diagram
(c) Box and whisker plot
(d) Pie chart

Ans 45. (d) Pie chart

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